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THE LIVING BIRD

Quarterly

Winter 1987

IRENE HINKE-SACILOTTO

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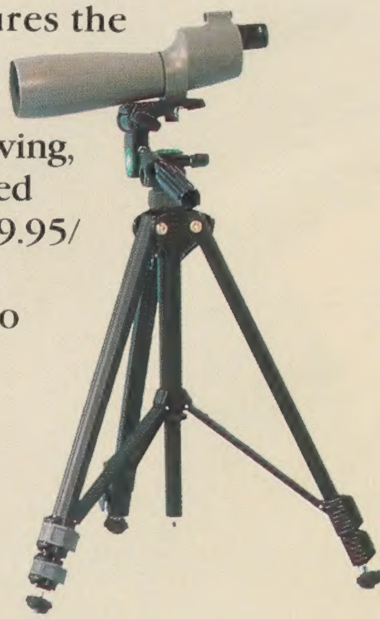

THE LIVING BIRD *Quarterly*

Winter 1987 Volume 6 Number 1

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Front Cover: Great horned owl in the foothills of Alberta, Canada. Photograph by Tim Fitzharris. **Back Cover:** Outside–Tufted puffin, Pribilof Islands, Alaska. The long feather plumes are breeding adornments worn in summer. Photograph by Phyllis Greenberg. Inside–Likeness of a Crow by Leonard Baskin. Courtesy Kennedy Galleries, New York.

The Hummingbird Lady

ALDO Leopold once warned that "becoming serious is a grievous fault in hobbyists." Actually, he was of two minds on the subject, because he greatly admired certain hobbyists who had become serious. Anyway, some years ago I slid into such a "grievous fault."

I was fascinated by raptor migrations, and I began hawk watching regularly, spring and fall. So far, so good. As my teenaged friend the Strikeout King suddenly exclaimed one September morning while staring through his binoculars at a hawk circling near us, "Wow, I love watching birds of prey!" Before long, however, that pleasant exercise was mostly shoved aside by other activities. I decided that hawk watchers needed organizing—needed to keep better records and standardize record-keeping and send observations to a clearinghouse, which of course would have to be created. This would produce a better picture of raptor migrations than we had when this impulse overtook me; until the mid-1970s, hawk watching was a very individualistic avocation, and the observations made by hawk watchers often went no farther than their lookouts.

I joined some other grievously faulty hawk watchers in setting up a hawk migration conference, from which sprang the Hawk Migration Association of North America. This led me, with apparent inevitability, to take on an endless series of volunteer tasks—writing and editing and organizing—that have demanded a good deal of my time since 1974. Sometimes they take over my life altogether. Every now and then, when they compete directly with other, more remunerative projects, I try to figure out how I got into this . . . well, I won't say "mess," but you understand what I mean. I mean, I could still be interested in birds just for the fun of it. So I am fascinated by other birders who have gone down a primrose path similar to mine, and as soon as I heard about the Hummingbird Lady I knew I had to meet her.

I'm fascinated by other birders who have gone down a primrose path similar to mine, and as soon as I heard about the Hummingbird Lady I knew I had to meet her.

The Hummingbird Lady, a.k.a. Nancy Newfield, lives in Metairie, Louisiana, on the western fringe of New Orleans, in a small frame house on a side street, with a little enclosed garden out back. She's a smallish, precise, active person, married, with two nearly grown daughters. Her husband, Skip, is in the oil business. Nancy does Skip's books, and they share a cluttered office in the sunroom, with hummingbird feeders and flowering shrubs outside the tall windows. Nancy *needs* an office, all right, because in the past 12 years or so, while banding more than 1,500 hummingbirds, she's become a clearinghouse of information about North American hummingbirds.

It all started like this: Nancy had always been interested in animals, and she studied zoology as a Louisiana State University undergraduate. But she was only an out-the-window birder until Skip gave her a field guide. That was literally an eye-opener. She hadn't realized how many different kinds of birds there were. "It was like giving me a shopping list," she told me. "It said to me, 'Go out and look for them.' Even then I didn't do a lot of 'birding' as I know it today. I didn't know that anybody did that kind of crazy thing."

In the winter of 1974–75 she put up a hummingbird feeder in the garden. Wintering hummers were supposed to be rare in Louisiana, but they were occasionally reported, and sure enough, in January she caught sight of one at the feeder. She told a birding friend that she'd like to try to attract more and to see them up close. He suggested she fill her garden with plants that flower in fall and winter, which would bring passing hummers into the garden, and then they'd come to any feeders she hung close to her windows.

She tried it, and it worked. "I had a very nice fall migration the next year," she said. "I had a lot of ruby-throats and one rufous. Then, late in October, when most of the ruby-throats had gone through, I had a couple of birds that didn't look like ruby-throats, but I didn't know what they were. They turned out to be young male black-chinned hummingbirds."

That western species had been recorded in Louisiana only eight times before, yet by Christmas Nancy Newfield had seven different black-chins at her feeders. (She told them apart by charting the patterns of colored feathers in the unfinished gorgets on their throats.) There were other black-chin reports in Louisiana at the same time, and people suspected that the black-chin invasion was just a freak. But Nancy had a few black-chins at her feeders each of the next two winters. "They came right around the third week of October," she said, "and I thought, 'You know, this is a pattern.'"

She suggested to friends in the LSU ornithology department that a graduate student might undertake a study of wintering hummingbirds in Louisiana. But there were no takers. So, she said matter-of-factly, "it was left to me." *Voilà* the primrose path.

In the summer of 1978 she applied for a federal banding permit, which she did not receive until after the next winter—"the absolute best winter I have ever had here. I had between 30 and 50 hummingbirds of five different species. Rufous, black-chinned, ruby-throated, broad-tailed—a juvenile male, the second state record for the species—and an adult male Allen's—the third state record. Elsewhere around New Orleans we also had three buff-bellied hummingbirds." All told, pretty good for a few gardens in an area not known for its wintering hummers.

The federal banding permit finally arrived with the hundred bands she'd asked for. To her surprise the "bands" were simply stamped on a sheet of aluminum, as thin as a fingernail. She was expected to scissor out each one, file it to precise size, and shape it into an anklet. That was in keeping with the spirit of the whole project. Almost no one was banding hummingbirds in North America; even now Nancy is aware of only a handful of such banders. "I had to develop all of my own techniques—from shaping and applying the bands to taking the birds' weights and measurements." She banded her first hummingbird that October, the first bird of any species that she'd ever banded.

Since then her project has expanded far beyond her backyard. Guided by telephone calls from an ever-widening network of cooperators, she has banded all over Louisiana. She has ringed 325 wintering hummingbirds—about a fourth to a half of all the hummers reported in the state in each of seven winters—and 1,500 hummers in all. She has also trained other birders, who have banded about 500 more under her permit.

Her banding routine begins, of course, with the trapping of the bird. Hummers are often caught in cage traps set up around established feeders, with a trip-line strung to some convenient blind, such as a parked car. Where a feeder trap isn't appropriate or doesn't work, there are hummingbird mist nets, with a mesh finer than grandma's hairnet. Once the bird is caught, which may take all day or may never happen, Nancy slips it into a small cloth bag to keep it quiet for the few minutes she needs to arrange her equipment—the diaper pin that holds the tiny bands, the orthodontist's pliers she has adapted for applying bands, her notebook, scales, ruler. Then she carefully rings the bird.

"More than two thousand banded, and not one broken leg," she told me. Next she checks the bird's condition, looking for parasites and abnormalities—"I've had two birds that were missing a foot." She weighs it and measures the bill, wing, and tail, which helps confirm the bird's identity and its age and sex; winter hummers are not wearing their most obvious plumages—"frequently they're pretty ratty looking"—so the measurements can be crucial.

Nancy Newfield, a.k.a. the Hummingbird Lady, weighs a tiny subject.

STEVE HOPE

Nancy set two main goals for her project. One was to develop an improved and documented picture of winter hummingbird populations in Louisiana. "It's important to know where these birds are—or should be—at all times of the year," she said, and when she started virtually nothing had been written on the subject of wintering hummingbirds in Louisiana. Now there has been—Nancy's papers in *The Condor* on various hummingbird records. Her second goal was to discover better field marks for hummers than are found in the standard field guides; goal number two helps produce goal number one, by increasing the accuracy of field identification. She's done that too.

Along the way the Wilson Ornithological Society gave her the Margaret Morse Nice Award (named for another amateur ornithologist who fell into the grievous fault of becoming serious about her hobby), and other birders began writing to her about hummingbirds. Now, because of what Nancy has found out, there's more for her to do—expanding the winter research beyond Louisiana, for example, and writing more papers and producing the first field guide to North American hummers.

Beyond all that there's even more—infinite amounts of More, judging from my own experience. "There needs to be continuous work," she said recently, "because I'm already seeing changes take place. For instance, buff-bellied hummingbirds used to be irregular and rare in winter here, but now we are seeing more and more of them. That's a change in the distributional pattern that ought to be monitored." And more work needs to be done outside the U.S., she went on. "With some of the western species, it's almost as if they evaporate once they leave the United States in the fall."

I think the force that points the likes of Nancy Newfield and me down such endless primrose paths is a passion for *knowing*, in a field in which, relatively speaking, almost nothing is known. Some ornithologists may bridle at that remark, but the fact is we are just scratching the surface in bird study, which is why an amateur, with only a few years' work, can add greatly to the existing body of information.

Joseph J. Hickey, one of Aldo Leopold's students, commented on this subject in the 1940s, in *A Guide to Bird Watching*, and what he wrote is as true today as it was then: "Let no layman suppose for a moment that . . . the last pages of [ornithology] have been written. To the naturalist of today has been delegated a vast field . . . , [and] unquestionably the amateur's opportunities are almost unchallenged and virtually unlimited."

—Michael Harwood

Death on an Island

JULIE A. SAVIDGE

When I arrived on Guam in October 1982, I was prepared for the sultry weather. I had been on the island the previous summer conducting bird censuses and knew that soon I'd be soaked with sweat and rain and covered with mosquitoes.

What I was not prepared for was the incredible decline in bird populations that had occurred during my absence. I knew that many of Guam's bird species had been decreasing in numbers for several years. But now, portions of the island which had echoed with bird song just one year before were completely silent. My mission was to find out why, and I realized quickly and soberly that I wouldn't have much time to solve the mystery of perhaps the most dramatic avian decline in recent history.

I already had a professional interest in the causes of modern extinction when, a few years earlier, I attended a wildlife conference in California and heard a lecture on human-wildlife relationships on Guam. The island's birds were decreasing at a phenomenal rate, some nearly to extinction, but the cause was unknown. Finding the cause seemed an interesting and challenging problem.

The following year I began graduate studies at the University of Illinois, and contacted Robert Anderson of the Guam Division of Aquatic and Wildlife Resources (GDAWR) about the possibility of conducting my thesis research on Guam. I was delighted when Bob offered me a summer job helping to census forest birds. When the summer ended I yearned to continue my studies on the bird decline, so when GDAWR offered me a research contract, I accepted eagerly—never guessing what I would learn over the next three years.

Guam is southernmost of the Mariana Islands, a small chain situated about halfway between New Guinea and Japan. The island is largest of the group but is still small, about 28 miles long and 4 to 8 miles wide. Except for brief Japanese occupation, Guam has remained under the control of the United States since the Spanish-American War of 1898. Although many people think of Guam as an ugly military base, it is actually a beautiful tropical island. The northern half is a raised limestone plateau where towering cliffs overlook lush forest and white sand beaches or rugged coastline. Southern Guam is mountainous with extensive grasslands and forests with streams and cascading waterfalls.

Several decades ago Guam supported 18 native and seven introduced bird species. Recently, however, all 10 of the native forest species as well as several other species have declined precipitously. These include the native white tern and introduced Philippine turtle dove. The birds disappeared first from the southern forests of Guam, their ranges gradually contracting northward. By 1983 the only place where all 10 forest species could be found was a small strip of mature forest at the island's northern tip. Now most forest birds are virtually extinct. Two of them were unique to Guam: the Guam flycatcher and the Guam rail, which was once so abundant that it was hunted legally.

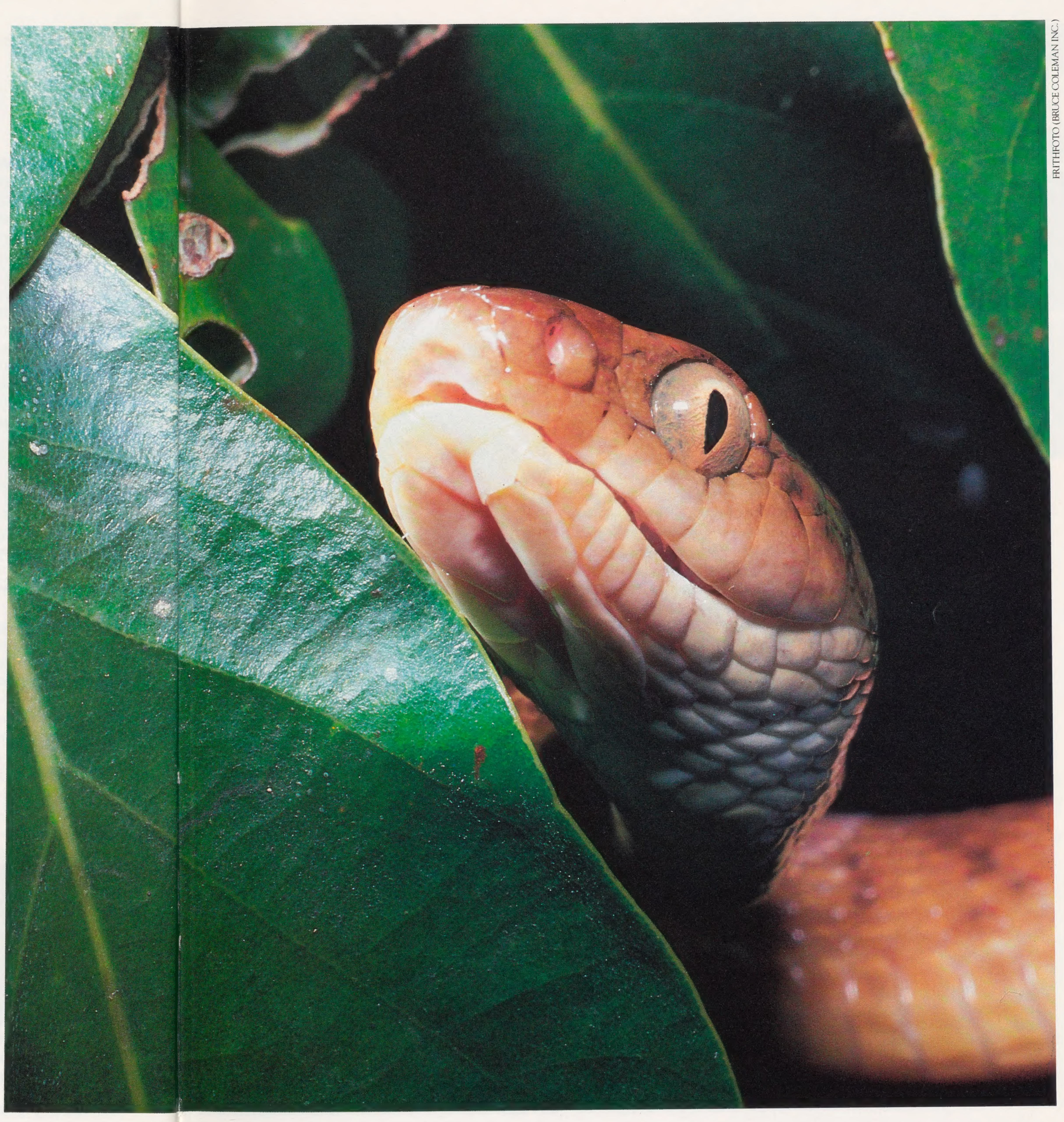
Extinctions are not uncommon on islands. In fact most recent avian extinctions have been of island-dwelling species, and 57 percent of all bird species currently endangered inhabit islands. There are several reasons for this.

First, bird populations on islands are usually small, so any factor that causes large numbers of birds to die—for example, pesticide poisoning, predation, disease, overhunting—has an exaggerated effect on the population. Also islands are often isolated, so it is difficult for their populations to be replenished by birds from other islands or the mainland.

Second, islands themselves are frequently small, therefore destruction of relatively small amounts of habitat, whether by human development, browsing by introduced pigs or cattle, or invasion by exotic plants, can significantly reduce the area where birds can live.

Third, many island birds lack defenses against introduced predators and diseases. For example, the

What is causing the extinction of Guam's birds—pesticide poisoning? Habitat destruction? Exotic disease? Or an introduced species such as *Boiga irregularis?*



FRITHFOTO (BRUCE COLEMAN INC.)

great auk, an island bird which was flightless and unafraid of humans, became extinct after hunters killed them all for food and feathers. And some Hawaiian species, such as the Laysan finches, sleep with their bills and legs exposed, making them vulnerable to introduced mosquitoes that transmit avian malaria and pox.

When I arrived on Guam, all the factors which have caused birds to become endangered on other islands—pesticide contamination, overhunting, habitat destruction, exotic diseases, predation—had been suggested as possible reasons for declines of Guam's birds. Several of the factors, however, already had been ruled out. Studies done by the U. S. Fish and Wildlife Service (USFWS) had shown that Guam birds and other animals were largely free of organochlorine pesticides. Overhunting was an unlikely cause since birds had declined on controlled-access military land. Habitat destruction didn't seem to be a problem; extensive forests remained throughout the island, including several that contained numerous birds just a decade ago. That left exotic disease and predation as the most likely explanations.

Of the two, disease seemed more plausible. Evidence suggested that disease was causing similar declines in some of Hawaii's native birds. In fact when I arrived on Guam I fully expected to identify a mysterious exotic disease. I began my studies, therefore, by testing a variety of Guam birds for parasites, bacteria, and viruses. I also exposed four species of birds to potential diseases by keeping them in the forest in open cages through which mosquitoes and other disease-transmitting organisms could enter. Neither study revealed any infectious diseases that could account for the bird decline.

By now I'd been on the island for more than a year and the apparent futility of my efforts left me frustrated. Nevertheless I plowed on, turning my attention to predators and their potential impact on the birds. There were two possible villains.

First was rats. These have caused the extinction of numerous island species, including the recent disappearance of the Stead's bush wren and Stewart Island snipe on Big South Cape Island, New Zealand. Three rat species have been introduced to Guam, but they are also found on islands immediately north of Guam where bird populations are stable.

Then there are monitors—3-foot lizards that prey on birds. One day I had an unusual experience with one of these creatures. I had found one of the last known Guam rail nests in the forest and had set up my tent nearby to use as a blind for observing rail nesting behavior. Unfortunately I had brought a peanut butter and jelly sandwich with me and a monitor decided it wanted my food. I spent two hours smacking him in the nose with my tennis shoe as he persistently tried to crawl into the tent, even after I ate the sandwich. Despite this episode I found no evidence that monitors were as much of a problem to birds as they were to hungry researchers. Like the rats, monitors also were found on adjacent islands where birds were not declining.

FRANS LANTING (BRUCE COLEMAN LIMITED)

THOMAS SEIBERT

NICK & GIDGE DRAHOS

What was left? Many native Guamanians claimed the culprit to be the introduced brown tree snake, *Boiga irregularis*. At first I found this idea hard to believe since no reptile ever had been shown to cause the extinction or decline of any animal species. Still, the snake did eat birds, was recently introduced from the Solomon Islands, Australia or New Guinea, and was the only predator on the Mariana archipelago found only on Guam. Brown tree snakes are nocturnal, forest dwelling, and some are quite large. Most of those on Guam are less than 8 feet, but an 11-foot specimen has been found.

To determine whether the snake was indeed the culprit I examined its diet, its range expansion on the island, and the status of other animals that it eats. I quickly learned that the snake consumes almost anything: lizards, birds and bird eggs, small mammals, even puppies. One snake had eaten three spareribs! Also, by searching historical records and interviewing Guamanians, I found that as the snake's range had expanded the birds' ranges had contracted, especially in forests. Species not declining, such as the native yellow bittern and the introduced black francolin, live in marshes or savanna grasslands of southern Guam where the snakes are uncommon. Furthermore small mammals, alternative prey for the snake, showed a pattern of decline similar to the birds. Apparently the snake was the culprit.

Why had the snake been so successful at decimating the birds of Guam? First, the snakes are very numerous. Animal populations frequently mushroom when introduced to a new location because they have no predators, competitors, or diseases to keep their numbers in check. The only other snake on Guam is a small, blind snake which lives in the forest litter and resembles an earthworm. Second, Guam is a relatively small island with few locations where native forest species can hide from the snake. Third, the snake is very adaptable. It forages on the ground as well as in trees, and because it consumes many different types of prey it can maintain its numbers even when birds become rare.

The snake has caused more than ecological damage. It has wreaked havoc with the island's power supply and caused million-dollar losses by short-circuiting high voltage power lines, resulting in damage to power company equipment and consumer appliances.

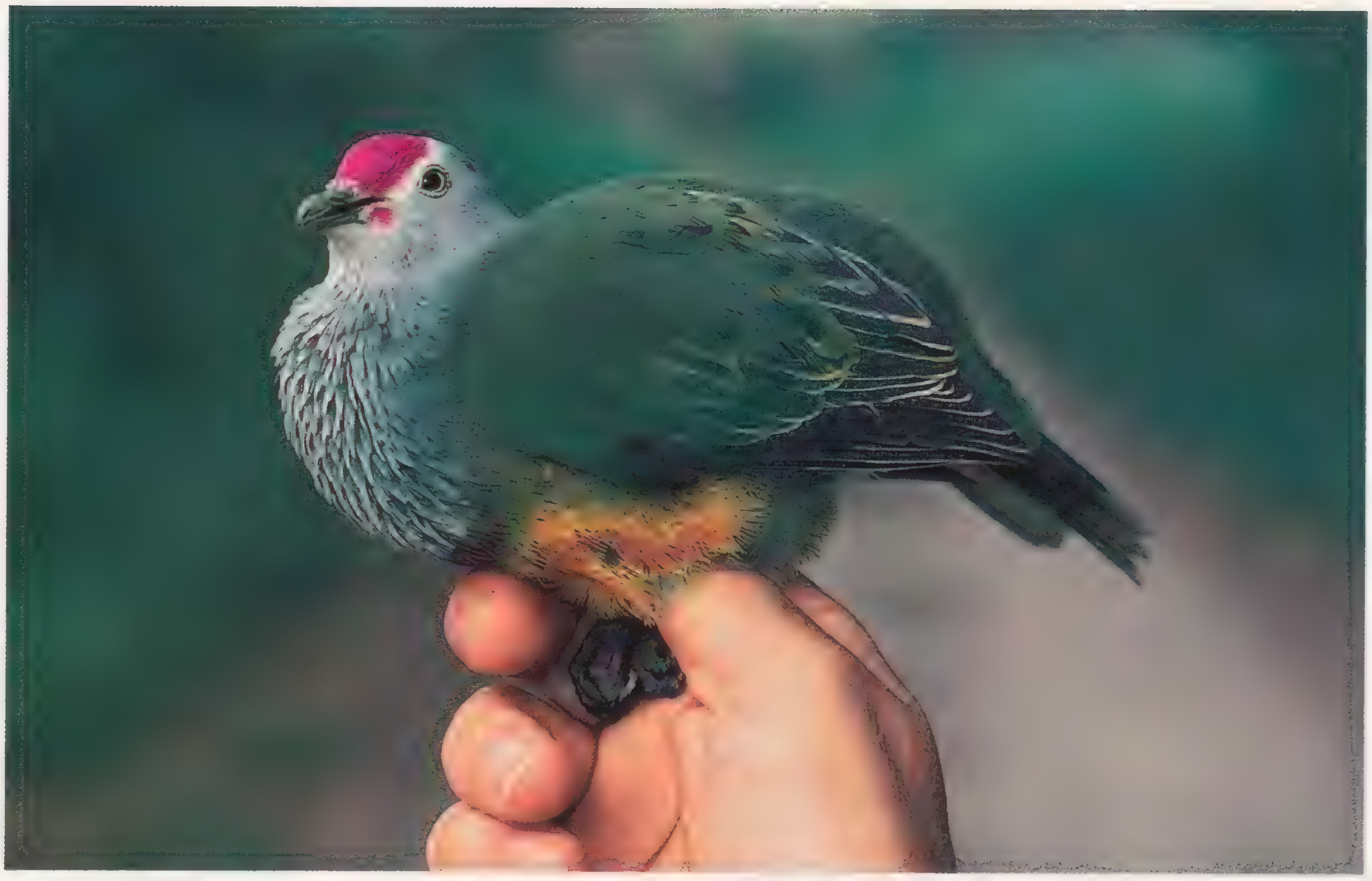
Then there's the psychological damage. One night my most aggressive snake, a female named Claudia, escaped in the GDAWR office. My co-workers begged me to find her as none of them cherished the idea of discovering the snake in a desk drawer. At last I found her curled up in a paper towel dispenser. How she managed to get in, I'll never know.

That wasn't her only escape. One day we were all working peacefully when screams of terror erupted

JOHN VISSER (BRUCE COLEMAN LIMITED) (3)

Guam's bird populations have been devastated by the brown tree snake, *Boiga irregularis*, which eats birds and their eggs. The white tern is an especially easy target since it lays its eggs directly on bare tree branches (top), but the secretive Guam rail (bottom left) and cavity-nesting Micronesian kingfisher (bottom right) have suffered as well. Above, the egg-eating snake of Africa shows the ease with which a snake can dispatch a large egg.

For the exploding snake population, it's a short hop to nearby islands. Unless brown tree snakes are strictly controlled, birds such as the Mariana fruit dove (right), already extinct on Guam, are in jeopardy on other islands in the Mariana chain. One strategy for reducing snake numbers is to use them in a tasty recipe, snake adobo. Below, Guamanian measures the main ingredient.



H. DOUGLAS PRATT

JULIE A. SAVIDGE

from the bathroom. I rushed in to find Claudia against the bathroom door and a public information officer hiding in the shower. I'm not sure whether either recovered from the incident.

By the time I discovered the snake's role in Guam's bird declines, it was too late for most of the forest species, such as the bridled white-eye, Guam flycatcher, and rufous fantail. However, GDAWR biologists were able to capture adequate numbers of the Guam rail as well as the Micronesian kingfisher, a unique subspecies on Guam, to begin captive breeding at several zoos. The rails are now breeding successfully in predator-proof cages on Guam and at zoos in the United States. Kingfishers also are breeding in zoos, but with perplexing problems. Some zoos have resorted to incubating eggs artificially and hand-rearing young, as eggs were disappearing and adult kingfishers were ignoring newly hatched chicks. About 70 rails and 40 kingfishers now live in captivity. Biologists hope to develop a captive population of about 250 birds of each species and then to reestablish them in the wild.

Before the native birds can be reintroduced to Guam, however, the number of brown tree snakes must be reduced. This will be a difficult endeavor as snakes have never been controlled on a wide scale. Possible methods of controlling the snakes include hand trapping or use of attractants, or biological control through the release of a specific disease or parasite. GDAWR biologists are also attempting to snake-proof the remaining nest trees of the Mariana crow. And to encourage use of snakes by Guamanians, recipes such as snake adobo and sweet-and-sour snake are being distributed to the public.

Of primary importance is to develop methods of keeping the snake from invading nearby islands. In jeopardy are many endemic species such as the Tinian monarch, Palau fruit dove, and Pohnpei lory. Since Guam has important military bases and a major port, and is a hub of air traffic in the western Pacific, there is great danger of brown tree snakes being transported to other locations. As a caveat of future problems, six snakes recently were found in the cargo hold of a ship loaded with scrap automobiles destined for Korea. Luckily the snakes could not have survived Korea's temperate climate.

If effective methods of controlling the snakes are found, we can hope for a reduction in their population sufficient to allow reintroductions of the Guam rail and Micronesian kingfisher as well as such birds as the rufous fantail and Marianas fruit dove which, though extinct on Guam, still occur on nearby islands. But it is already too late for most of Guam's birds, and their disappearance may have secondary effects on the rest of the island's fauna and flora. For example, plants that depend on fruit-eating birds for seed dispersal also may decline.

It's sad to watch species disappear and to feel totally helpless to reverse the process. I hope the situation on Guam will serve as a reminder of the dangers of exotic introductions and the astonishing rate at which extinctions can occur on islands. □

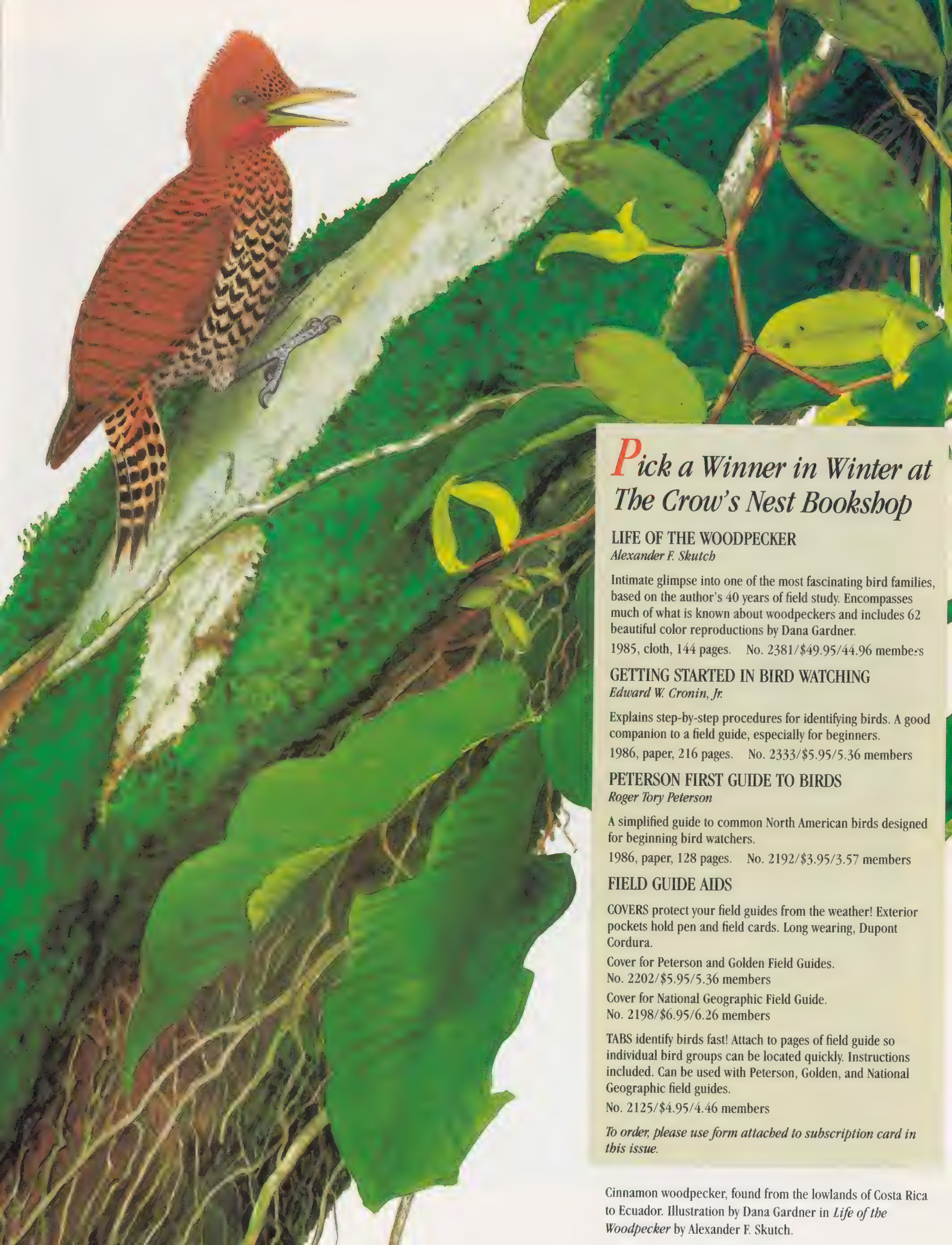
Julie A. Savidge is a biologist with the Guam Division of Aquatic and Wildlife Resources.

Further Reading

Jenkins, J.M. *The Native Forest Birds of Guam.* American Ornithologists' Union Ornithological Monographs No. 31, Washington, D.C. 1983.

Quammen, D. "Island Getaway: Insular Biogeography and the Scourge of Guam." *Outside.* October 1985.

Sheppard, C. "Silence on Guam." *Animal Kingdom.* July/August 1985.



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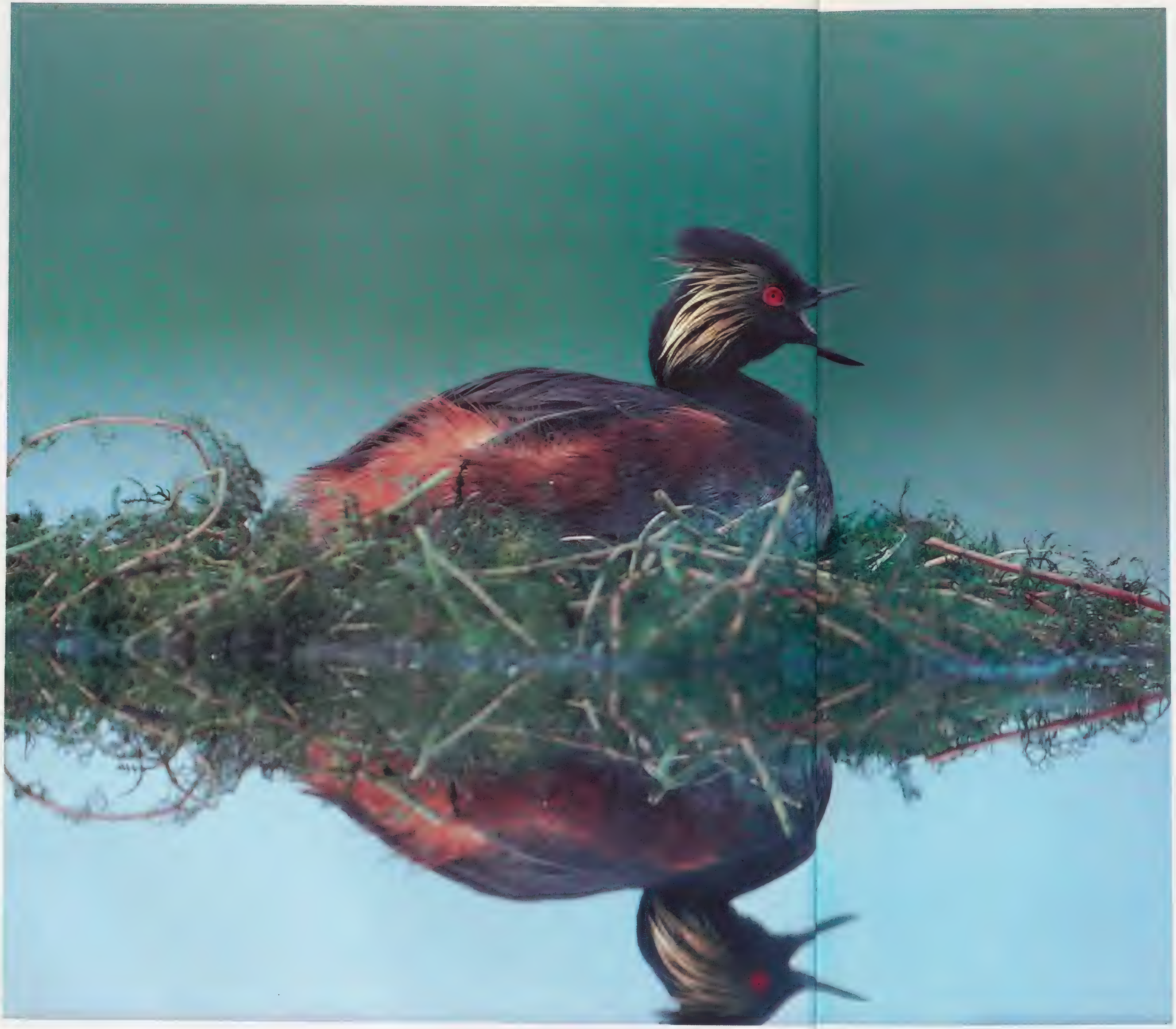
Cinnamon woodpecker, found from the lowlands of Costa Rica to Ecuador. Illustration by Dana Gardner in *Life of the Woodpecker* by Alexander F. Skutch.



PRICELESS ANTIQUES

TEXT AND PHOTOGRAPHS BY TIM FITZHARRIS

Swathes of mist rise through the cattails and bulrushes. The water is glass smooth. From the fog comes an assortment of sounds—splashes, cackles, gurgles, hoots, a watery snort. A mastodon looms up in the haze and as he moves he starts a slow, rolling wave across the marsh. In seconds the wave reaches a nest anchored to a clump of bulrushes. On the nest a grebe calmly rocks in the turbulence, intent on warming its four eggs.

Millions of years pass. Whistles, quacks, trills, and honks emanate from the marsh. The giant mastodon is gone, but a canoe paddle slowly stirs the water and its ripples reach a nest anchored in the cattails. A grebe sits quietly aloft. It yawns at me and my camera. Through the tunnel of lens I study its primitive form, which differs little from its ancestor.

The grebe stretches and arches its body. It drags a few green sprigs over the nest and slips into the water. A scream rips the solitude. A saber-toothed tiger? No, a truck sounding its horn from the highway that leads into Calgary's sweating industrial sector. My mind bounces back to the 20th century and I remember it's time to head home for breakfast. The grebe does not pause from its hunting as I paddle back to shore.

Along with loons, grebes share the distinction of being one of the oldest living bird families in North America. In fact, recent evidence suggests that grebes first appeared 70-million years ago, when dinosaurs still roamed the Earth. As the epochs rolled by, the family apparently changed little in appearance and still retains characteristics that ornithologists consider primitive. For example, grebes are nearly tailless, and their legs are at the rear of the body. As a result the birds are excellent swimmers, but weak fliers, and on land they can only waddle awkwardly.

Nevertheless grebes have inhabited North America's lakes, sloughs, and marshes throughout the centuries, and today seven species are found across the continent. Red-necked, horned, and pied-billed grebes are widely distributed, western, Clark's and eared grebes are found primarily in the West, and the tiny least grebe extends its breeding range into the southernmost tip of Texas.

(continued on page 19)

Eared grebes use aquatic vegetation to build floating nests. While photographing this incubating bird, it peeped a warning at a passing gull.

BHL

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The nest deteriorates rapidly and must be maintained by the parents throughout the incubation period. Should they leave to forage or copulate, loose material is dragged over the eggs to hide them from crows, gulls, or magpies. This practice also prevents the unattended eggs from overheating in the sun. An eared grebe colony is an exciting place for a photographer in mid-June. With a hundred birds engrossed in various stages of reproduction, so much happens so quickly that it's difficult to know where to point the lens. I shoot as many pictures as possible then, once the film is developed, I piece together the events and savor them again and again.

Cornell University Laboratory of Ornithology

ANNUAL REPORT 1985/86

My fifth year as executive director of the Laboratory has drawn to a close and it's a time for reflection. During those years the Lab has made tremendous progress. We've increased our membership and staff and improved our programs and sense of direction.

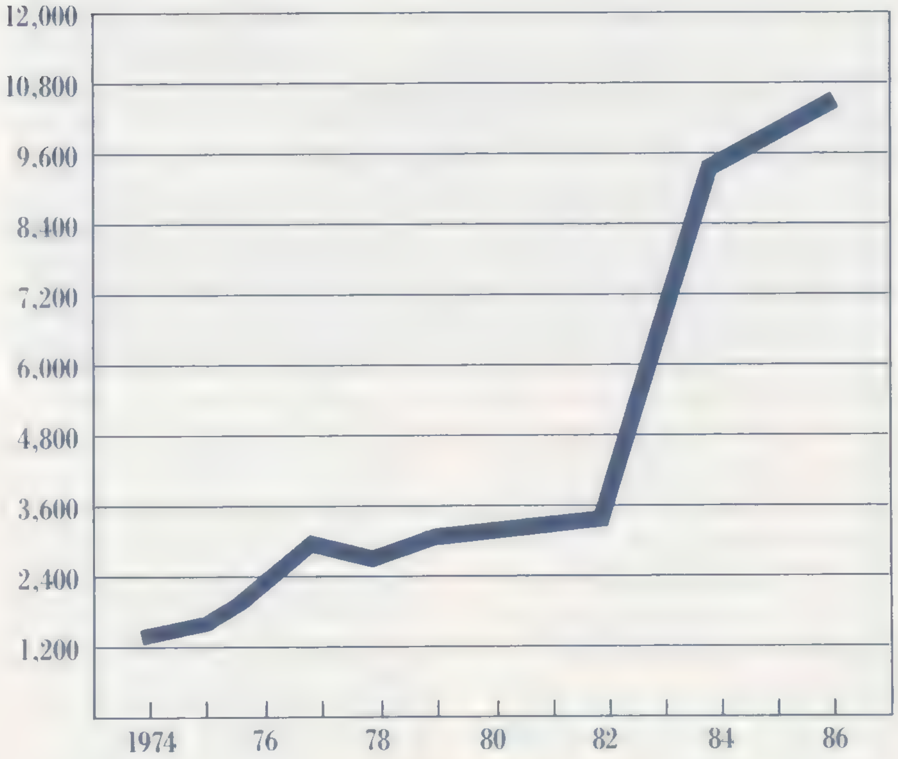
Consider membership. Our numbers have grown substantially, from fewer than 3,000 members in 1980 to more than 11,000 in 1986. That's important because a larger membership means greater financial support and bigger and better Lab programs.

Also consider our staff. Five years ago the Lab was run by a handful of exhausted biologists. Today we employ nearly 50 workers including editors, librarians, photographers, bookkeepers, technicians, sound engineers, computer specialists, and more biologists.

It's exciting to have new energy here. For example, 12 staff members attended the 19th International Ornithological Congress in Ottawa, Ontario last summer. We were involved in sessions as varied as recording bird songs, managing suburban wildlife, preserving loons, and studying the homing of pigeons. As the staff continues to increase in numbers and abilities, our contributions to ornithology grow, and our ties with the ornithological community are strengthened.

We also have a new five-year plan, the first in the Laboratory's history, which has been helpful in identifying our priorities. It was approved by the administrative board in October 1985 and describes each of the Lab's programs, lists the goals of each, and sets target dates for achieving the goals.

And the programs themselves? Old ones are still going strong and new ones have been added. Let's take a look at this year's developments.



LABORATORY MEMBERSHIP

BIRD POPULATION STUDIES

Last winter this program, formerly known as the Cooperative Research Program, outgrew its old quarters and moved to a mobile office across the street from the main Laboratory building. With new computer equipment from IBM Corporation, computing time supplied by Cornell University, and funds from the U.S. Fish and Wildlife Service (USFWS), the staff plunged into analyses of Colonial Bird Register data—information on colonially nesting birds collected for the Lab by volunteer birders throughout the country—and data from annual Christmas Bird Counts sponsored by the National Audubon Society. These counts also are conducted by volunteers.

Some findings: the numbers of mallards and black ducks reported on Christmas counts have declined sharply over the past 35 years. On a more cheerful note, the numbers of several raptor species reported on Christmas counts have increased over the past 10 years. Also, Colonial Bird Register data suggest that least tern populations along the northeast coast have stabilized over the past 10 years, a marked contrast to the precipitous decline seen during the preceding decade.

These findings are exciting because they confirm trends shown by other studies including USFWS aerial surveys. Had our results been different, we'd be forced to question the validity of our volunteer-collected data. But the fact that our findings agree with those of other studies suggests that data collected by volunteers, when carefully analyzed, can be used to construct accurate indexes of bird species abundance. Such indexes should be useful in detecting changes in the environment, either natural or human-caused, which could be ecologically harmful or beneficial. Soon we'll begin using our data to examine population trends of previously unstudied bird species.

In April 1986, Bird Population Studies hosted a conference on atlasing breeding birds in the northeastern United States. A breeding bird atlas is a survey, usually conducted by volunteer birders, of the distribution of birds breeding in a specific area, typically a state. The conference attracted more than 50 participants from 19 states and three Canadian provinces. Next August the Laboratory will sponsor a national conference on atlasing in conjunction with the annual meeting of the American Ornithologists' Union in San Francisco. The Lab is serving as a catalyst, bringing together people from states which already have completed breeding bird atlases and people from states where atlases are just beginning.

The Laboratory is reaching out for help to make Bird Population Studies grow. The National Audubon Society and USFWS are assisting with data collection, and we've initiated a Corporate Associates Program for financial sponsorship. Exxon Corporation has pledged $35,000 as a charter associate, and the Johnson's Wax Fund and The Williams Companies will become associates next year.

We are confident that changing bird populations will make good environmental monitors, and to explore this idea further, we are holding a symposium in May 1987. The gathering will provide an opportunity for birders, ecologists, population biologists, and corporate environmental scientists to discuss how information on bird populations can be used to detect environmental change. The symposium will be hosted by the Johnson Foundation at its conference center, Wingspread, in Racine, Wisconsin.

PROJECT BIRDWATCH

Last summer we began a new research activity called Project BirdWatch. If successful, it eventually will enable thousands of volunteer observers to report weekly bird observations to the Lab for use in monitoring bird populations nationwide. We've been testing Project BirdWatch in New York state with the help of the Federation of New York State Bird Clubs. Here's how it works:

The Lab supplies observers with a bird list printed on a specially designed form. Each week, observers record the species and numbers of birds they've seen by filling in circles on the forms. Then they mail the completed forms to the Lab, where our computer reads them and stores the information. The data remain in our files for analysis.

Project BirdWatch is being managed by Laboratory Extension Associate Charles R. Smith and is based on a similar program organized by Stanley A. Temple of the University of Wisconsin. Stan has used his program to identify patterns of bird migration and distribution in Wisconsin. If our initial tests on Project BirdWatch are successful, we'll expand the project nationwide.

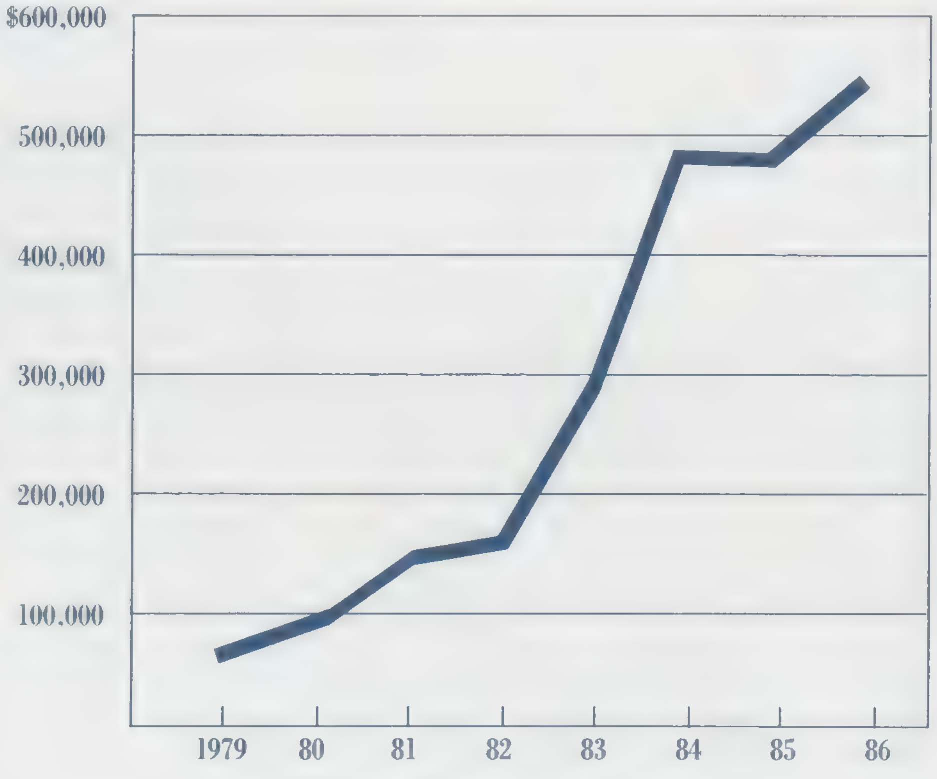
BIOACOUSTIC RESEARCH PROGRAM

This year also marked the inception of the Laboratory's Bioacoustics Research Program. Some history: in 1984 an ad-hoc committee reviewed the activities of our Library of Natural Sounds and recommended that we begin a new program that would use the Library's extensive collection to conduct research on the use and function of animal sounds. Committee member Crawford Greenewalt pledged substantial financial support, Cornell University agreed to provide computer hardware and advice, and the Lab's executive committee voted to provide space and additional funds.

Bird watchers nationwide contribute data to our Bird Population Studies.

A faculty committee was then formed from Cornell's departments of Music, Linguistics, Psychology, Anthropology, Engineering, Neurobiology and Behavior, and the Laboratory, to select a director and give the program initial guidance. This year the committee chose a director—Christopher W. Clark, an assistant professor at Rockefeller University. Chris has been studying animal sounds for years and is an excellent choice to get the new program off the ground. Studies will begin this spring.

Also on the sound front, Laboratory Associates Katharine Payne and William Langbauer have been conducting an exciting program of research on elephant acoustic communication. They have found that elephants produce complex sounds at frequencies below the range of human hearing and that these sounds probably allow elephants to communicate over long distances. Their results were published in *Behavioral Ecology and Sociobiology* and have received wide attention in the popular press, including a front-page article in the science section of the *New York Times*. Katy and Bill have received grants from the National Science Foundation, the National Geographic Society, and a private donor to continue their work.



TOTAL GIFT & MEMBERSHIP INCOME

LIBRARY OF NATURAL SOUNDS

Last summer the National Science Foundation awarded the Library of Natural Sounds with a three-year grant of $290,000, which will enable the Library to hire additional help for editing and cataloguing sound recordings. The arrival of the grant was timely; LNS has accumulated a substantial backlog of curatorial work, and recently has received several major collections of bird song recordings. Foremost among these are the excellent tapes of the late William Gunn, a longtime Laboratory associate. His collection was generously given to the Lab by Lucy Gunn.

SEATUCK RESEARCH PROGRAM

Studies at our research facility on Long Island's Seatuck National Wildlife Refuge continued to address the question of how to manage a small sanctuary in a suburban environment. Studies ranged from examining bird populations on the refuge and surrounding suburbia to identifying methods of developing good bird habitat on the refuge's salt marsh, while minimizing the population of ravenous salt marsh mosquitoes.

The Laboratory has been fortunate in attracting several partners in Seatuck studies: New York State Department of Environmental Conservation (NYSDEC), New York State Sea Grant, Suffolk County Mosquito Control, USFWS (which owns and manages the property), and numerous private organizations. A steering committee with representatives from the Laboratory, USFWS and NYSDEC continues to oversee the project.

THE PEREGRINE FUND

The Peregrine Fund also had a successful year. Peregrine falcon breeding operations were consolidated at the new World Center for Birds of Prey in Boise, Idaho, where 173 young peregrines were raised in captivity for release to the wild. Also, 43 breeding pairs of peregrines were identified in the wild in the eastern United States. These pairs raised 53 young, and the eastern peregrine population, once extinct, is continuing to grow.

The Peregrine Fund hopes that eventually the population will be able to sustain itself without additional releases of captive-reared birds.

PIGEON NAVIGATION PROJECT

The pigeon project received a new, three-year grant from the National Science Foundation as well as support from pigeon racers and national racing organizations. With this support we continued to explore the question of whether pigeons navigate using odors or the Earth's magnetic field.

The most recent evidence suggests that pigeons may home by using both cues, so that pigeons growing up in different environments may select different cues to find their way. This idea might explain why homing experiments conducted in Germany, Italy, and the United States have yielded contradictory results.

EDUCATION AND INFORMATION SERVICES

The Living Bird Quarterly walked away with three awards in the annual recognition program of the Council for the Advancement and Support of Education (CASE). The magazine won gold medals in the overall magazine publishing and special audience publications categories, and a bronze medal for visual design.

Despite dreadful weather, the Lab's new, week-long summer courses in bird biology and photography were well received for the second year. Enthusiastic Lab members from across the country slogged through mud and endured chilly winds while learning to identify birds and to take beautiful nature photographs. Also, enrollment in our correspondence courses continued to grow; more than 500 new students enrolled in our home study courses in bird biology and nature photography.

As you can see, we've gained ground in all our programs this year. Unfortunately this presents a few problems. Expansion requires more resources, both in terms of space and finances. Space is a chronic problem at the Lab—the building is bursting at the seams, and we're constantly struggling to find room for increasing staff. Soon we'll have to build a larger facility or add to our present one, an expensive undertaking either way.

The financial news for 1985/86 is mixed. The good news is that we raised more funds from memberships and unrestricted gifts than ever before. As you can see from the chart (left) and table (right), unrestricted gifts were up nearly 9 percent, while membership funds increased by 16 percent. The bad news is a deficit of $167,000 because our programs grew faster than our ability to raise money. Fortunately we've had a stern but generous parent in Cornell University, which requires that we balance our budget, but has been patient and supportive when we fall short. Nevertheless our deficit must be repaid soon.

We hope next year will be more prosperous. As we search for additional funds we've tightened our belts a little. We keep moving forward, though, buoyed by an enthusiastic staff and the tremendous support we've received from our members and donors. Our thanks go to all supporters for their continued role in helping to make the Cornell Laboratory of Ornithology an important center for the study of living birds.

Charles Walcott
EXECUTIVE DIRECTOR

YEAR END FINANCIAL REPORT

July 1, 1985–June 30, 1986

INCOME

Unrestricted and Designated:	
Membership	$ 337,697
Gifts	210,624
Investments	11,593
Cornell Subsidy	88,102
Bookshop (net income)	183,588
Library of Natural Sounds	9,053
Education and Information Services	143,852
Miscellaneous	46,697
	$1,031,206
Restricted:	
Library of Natural Sounds	$ 47,972
Education and Information Services	6,555
Pigeon Research	82,939
Seatuck Research Program	239,312
Cooperative Research Program	134,022
Breeding Bird Atlas	82,034
Miscellaneous	32,896
	$ 625,730
Total Income	**$1,656,936**

EXPENSES

Bookshop	$ 248,661
Publications	167,722
Library of Natural Sounds	146,813
Education and Information Services	196,754
Operations	246,963
Membership Recruitment	81,677
Development and Membership Services	151,626
Pigeon Research	82,939
Seatuck Research Program	239,312
Cooperative Research Program	134,022
Breeding Bird Atlas	82,034
Miscellaneous	45,685
Total Expenses	**$1,824,208**
Excess (deficit)	**($ 167,272)**
Fund Balance 7/1/85	**49,354**
Fund Balance 6/30/86	**($ 117,918)**

THANK YOU

Altogether, it took more than 11,000 friends, foundations, corporations, and federal and state agencies to keep the Laboratory running in 1985–86. Thank you one and all for helping to make the Laboratory a leading center for bird study. In addition, we offer special thanks to our members who gave as Benefactors, Sponsors, and Patrons.

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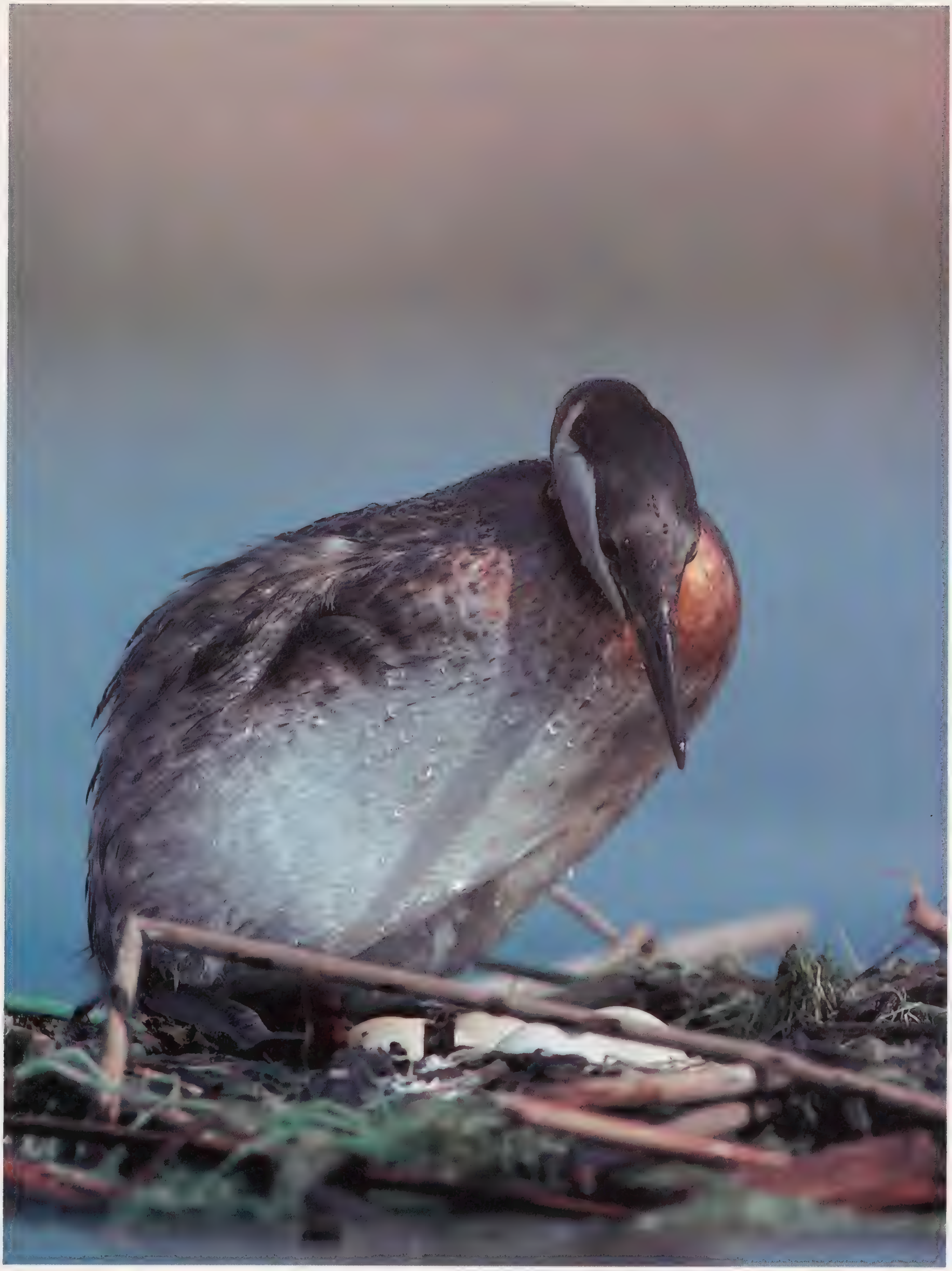
The western grebe assumes a large variety of postures. One of my favorites is when it cuddles up on itself to relax or grab a nap. This is a fine time to sneak in for a picture. But the grebe, ever wary, still keeps its big toes moving beneath the water, seldom permitting me to get as close as I would like. When I do catch a grebe at close range, I'm usually rewarded with a great view of its long graceful neck and piercing scarlet eyes. Paired birds usually take turns keeping watch—eagles and hawks may swoop down at any moment.



Camouflaged by a mobile blind, I came upon this red-necked grebe after stalking across a wheat field, railway track, and short stretch of sulphurous muck. The bird was so engrossed in its nesting duties that it paid little attention to me. Although superbly adapted for swimming, grebes have an awkward time climbing aboard and moving about their sodden platforms. Evident in this photograph is a brood patch, an area on the belly that an incubating grebe plucks clean to bring its warm skin into contact with the eggs.

My first experience with a grebe occurred about 15 years ago. I had started a new hobby—bird watching—and was hunkered down in an Ontario marsh waiting for a bird. In due time the stillness was broken by an eerie chanting that seemed to be lifted straight from an old Tarzan movie. I've heard the sounds of other grebes since then—the effeminate peepings of the western, the whistled chirps of the eared, the stuttering brays of the red-necked—but none were as impressive as that first bizarre serenade of the pied-billed. The amplitude far outmatched the dingy little bird I eventually spotted several yards away. As I stared, the grebe emitted a few more hoots, then sank into the water, leaving a faint ripple that dissipated over the mirrored surface.

Since that day I've watched grebes whenever possible. The most interesting time to observe them is in spring, when they return to their northern breeding grounds tingling with the reproductive hormones that will prepare them for creating the next generation.

The mating rituals of the western grebe are spectacular. The climactic sequence begins with a smooth glide by both male and female, each bird arching and flexing the long, supple neck over the back. Then both rise out of the water, churning furiously with their feet to maintain this vertical posture. They dance side by side over the water for eight to 10 yards, then collapse, coasting gracefully until their momentum is spent.

I once watched a pair of red-necked grebes involved in a courtship display on a small slough west of Edmonton, Alberta. Both birds submerged, then popped to the surface, facing one another a few feet apart. They propelled themselves fully erect with their necks extended and gaping bills angled toward the water. Then they circled one another in this strange manner while expelling a series of wails that carried far into the surrounding countryside.

These frenzied performances ready the female for copulation. Motionless, she stretches her neck and rests it on the water. The male loafs nearby as if building his nerve for the encounter. At last he meanders closer and peers over the female's back before hopping aboard to mate. He treads gently and then slips into the water whereupon both birds vocalize excitedly.

Grebe nests are built in shallow water by both pair members, and are improved throughout courtship, egg laying and incubation. Nesting material, consisting of whatever plants are available, is formed into a sodden, floating structure often anchored to emergent vegetation. During incubation the nest slowly sinks, but the parents continually add new material to keep the eggs above water.

While pied-billed and horned grebes are solitary nesters, western, Clark's, red-necked, and eared grebes breed in colonies of 12 to 200 birds. One June morning several years ago I observed the establishment of an eared grebe colony in Alberta. At first my attention was drawn to a gathering of about 60 grebes in one corner of the marsh. A lone, floating clump of vegetation was being defended by a female. Whenever she strayed to gather more nesting material, another grebe would hop onto the platform. Sensing this, she would whirl around and drive off the trespasser with a series of menacing peeps. Within an hour, however, other nests were started nearby and soon 25 of the platforms were concentrated in the small area. The colony seethed with industry as the birds marked territories, courted, mated, and thatched their nests. By sundown, several pairs were already fretting over their eggs.

It takes 21 to 25 days for the embryos to progress from yolk to downy chick that can swim and dive within hours of hatching. Sometimes the chicks' first forays into the marsh are atop the back of a parent. They ride piggyback for a week or more while gaining strength and learning to forage. Should they become dislodged, the parent partially submerges to allow the young to scramble aboard. Young grebes fall prey to snapping turtles, bullfrogs, pike, and gulls.

During September and October, adults and young that breed in northern regions begin their southward migration. More southerly nesting birds often head for the coasts where the water doesn't freeze. At this time, western and red-necked grebes assemble in flocks, sometimes of 1,000 or more. The birds' journeys begin with their stubby wings battling frantically to take off from the breeding pond. The lobed toes slap at the surface, helping to build speed for liftoff. With no tail feathers to slow momentum or change direction, the grebe's flight is as swift and direct as an artillery shell.

Unable to take off from land, the birds must stay in flight until they reach another body of water. In late autumn, grebes are sometimes found on iced-over lakes where they have set down in error. Here they succumb to starvation and cold or a hungry coyote, fox, or hawk. Despite this apparent handicap, grebes migrate long distances and when winter arrives in Canada, most are cruising about the warmer coastal waters of the United States and Central America.

Grebes are one of the Earth's small but great attractions. Watching their bizarre vocalizations, spectacular courtship rituals, and graceful movements is a balm to senses overdosed with designer seltzers and high-tech shoeshines.

Grebes have survived unchanged for millions of years, but never before have they been faced with such serious threats to their wetland habitat. Like other forms of wildlife, they are priceless—and antiques at that! Unfortunately the vault that should safeguard them for another dozen million years has become a paper bag that is rapidly disintegrating. Enjoy them while you can. ☐

In due time the stillness was broken by an eerie chanting that seemed to be lifted straight from an old Tarzan movie.

Tim Fitzharris is a wildlife photographer and author living in British Columbia.

Further Reading

Fitzharris, T. *The North American Wildlife Almanac.* Terrapin Press, Vancouver. 1986.

W. PERRY CONWAY

Red-tailed Hawks

One morning last July we awoke to a blood-curdling scream coming from our woods. The cry was two-part, starting high, then rising even higher. The sounds kept repeating and we scrambled outside to locate them. They seemed to be coming from the nearby treetops, but we could see nothing. Suddenly an adult red-tailed hawk sailed over our heads as the screams became more intense and then broke off abruptly. Putting the clues together we guessed that a fledgling red-tail had just been fed.

This scene was repeated many times over the next few weeks, and we finally located three fledglings. From one tree in particular we heard constant calling, and we had to reassure our neighbors that a cat was not being strangled or that some strange animal was not loose in the neighborhood.

Our story really begins several months earlier, however—late the previous winter on a day when the morning sun was just beginning to melt the few remaining patches of snow in the surrounding fields. We had gone to Great Meadows National Wildlife Refuge near Boston to look for red-tailed hawks. We knew this was the perfect time and place. From an observation tower we scanned the surrounding fields and hills. It was late February, when courtship and territorial behaviors are most common in the Northeast, and the warming sun was just beginning to create rising air currents, called thermals, which lift the hawks as they soar into the air.

No sooner had we climbed to the top of the tower when we heard our first *keeeaarr* call from above us. Raising our binoculars we scanned the horizon and picked up our first red-tail. Though distant we could identify it by its shape and occasional glimpses of red-brown on the tail. As the hawk rose in a wide circle we noticed a second, slightly larger red-tail join the first. Seeing two different-sized birds made us suspect that this was a mated pair, since female hawks are larger than males.

The two birds rode a thermal, one below the other, both making wide circles, one clockwise, the other counterclockwise. The circles got tighter as the birds closed the distance between them. They looked as if they were going to collide when suddenly the top bird lowered its talons and the lower bird swerved to avoid them.

The wind shifted and the two birds soared higher, then separated as the thermal dissipated. Suddenly the upper bird began a series of deep roller coaster loops, folding its wings at the summit, plunging steeply, then checking its fall by partly opening its wings and rising up again. Finally it rose higher and made one spectacular dive from a quarter-mile high all the way down until it disappeared among the trees. The performance was beautiful and lasted almost two minutes.

Red-tails perform such aerial interactions and maneuvers at any time of year. They are most common, however, in late winter and early spring, right before the nesting season begins.

Red-tailed hawk courtship is far from understood, but we have observed three behaviors believed to be associated with it. The first is the coordinated soaring with one bird just

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Donald and Lillian Stokes are authors of the Stokes Nature Guides which include *A Guide to Bird Behavior*, Vols. I and II.

above the other. The higher bird, which is often the male, may lower its talons and possibly even touch the lower bird. The second behavior is the roller coaster flight; this is often accompanied by a short, piercing *chwirk* call. The third is the dive or stoop from high in the air down into the trees sometimes near the nest site.

About 10 minutes after the last dive we obtained further evidence that this was a breeding pair when we saw one of the birds fly low through the trees, snap off a dead pine branch with its talons, and carry it to another pine. This pair was building a nest.

Both sexes participate in constructing the nest, which takes about a week to complete. During this time the birds are quite secretive and may desert the nest if disturbed. They often reuse an old nest, or remodel an owl, crow or squirrel nest. The hawks use twigs for the bulk of the nest and add a lining of bark or pine needles.

Interestingly, throughout the nesting season they deposit green twigs or sprigs of pine needles into the nest. They may do this to provide the growing young with clean material to rest upon when the nest becomes soiled. Another theory is that the green sprigs may contain aromatic compounds which repel parasites such as ticks and lice.

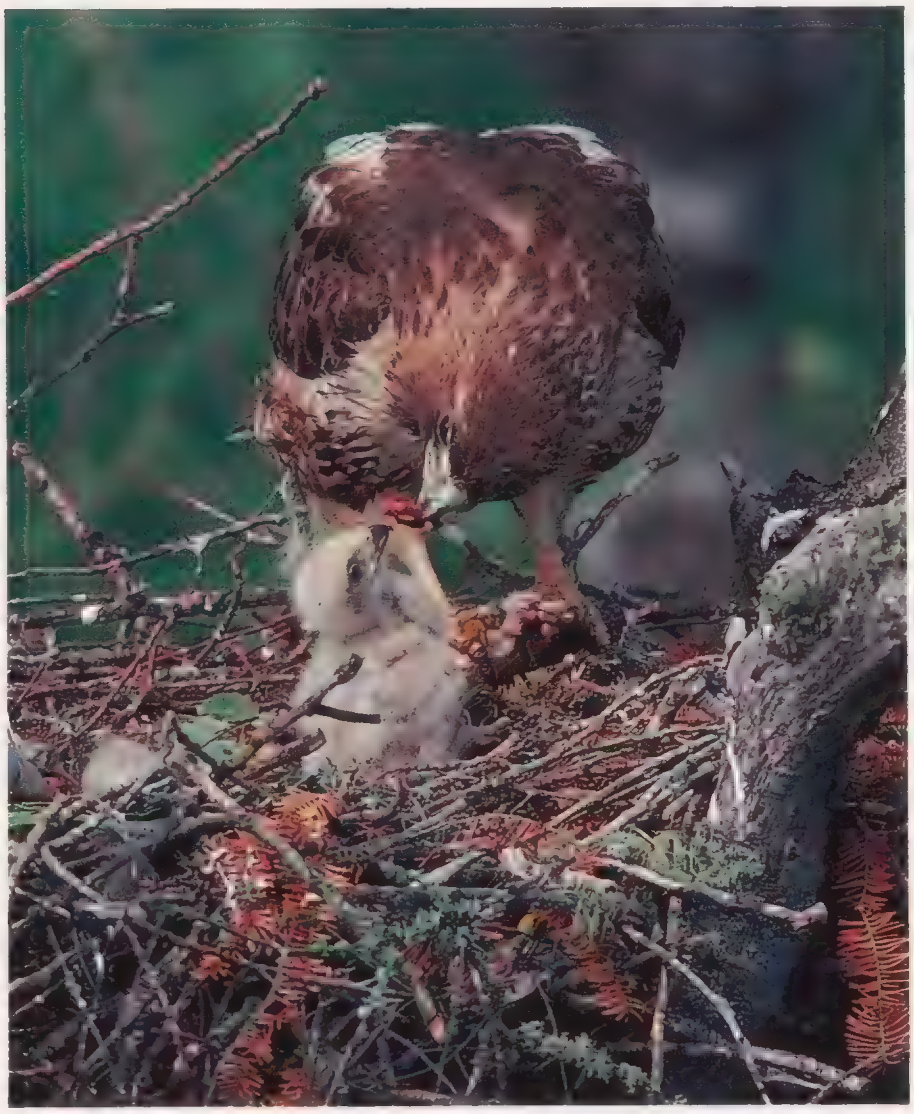
By 11 a.m. we could see red-tails in several directions along the horizon. At one point a third bird ventured into the area where our original pair still lingered aloft. One pair member soared toward the intruder, stayed above it, then lowered its talons and dove onto the intruder's back, giving the *keeeaarr* call. At the moment of impact the intruder rolled over in midair and presented its talons to the attacking hawk. The assault continued for several minutes until the intruding bird moved far enough away so that the original hawk stopped attacking and flew back toward its territory.

Territorial encounters have some of the same elements as courtship behavior, and it is not always easy to tell them apart. In general, territorial interactions involve more contact and the persistent following of the intruder until it is far away.

Red-tailed hawk territories can cover up to 1.5 square miles, but their size varies depending on food supply, location, season, and the density of the red-tail population. Territories may be held by the same birds for years. In order for a young bird to get one, it may have to wait until the death of a territory holder at which time it inherits both the mate and the territory. Until then, young birds may live in marginal areas or poach on an older bird's domain.

Once the mated red-tails have completed their nest, the female lays one to three eggs and incubates them for 35 days. After they hatch, the young develop rapidly. In 45 days they will grow from downy white balls of fluff to full-size fledglings.

At first the parents bring food to the chicks and tear it into pieces. At four to five weeks the adults just deposit the prey and let the nestlings feed themselves. They eat whatever is on the adults' menu—mostly voles, ground squirrels, and other small mammals. The fledglings stay in the parents' territory for some time, continuing to be fed but gradually learning hunting skills, and eventually wandering off on their own.


WAYNE LANKINEN (VALAN PHOTOS)

Red-tailed hawks are highly territorial, driving intruders from their nesting area, left. Both parents care for the young, bringing food and tearing it into bite-sized chunks.

The degree to which red-tailed hawks migrate depends on where they breed. All individuals breeding at the most northern latitudes migrate southward, while those birds breeding at mid-latitudes may remain in the same area all year.

Migratory red-tails winter in the southern United States and possibly Central America. A favorite winter activity of ours is looking for red-tails along highways. Hawks moving into an area often hunt for voles in the grass along highway shoulders and medians, or perch in trees in highway cloverleaves. These hawks often stay within very small areas and can be seen sitting on favorite perches.

Late in winter the hawks start to drift back to their breeding areas and no longer can be seen along the highways. That is when we wait for a clear day and head to our observation tower. We know that soon some red-tails will spread their wings in the rising air and be lifted into the blue.

—**Donald & Lillian Stokes**

Elusive Warbler

The Bachman's warbler is the rarest songbird in North America, so rare, in fact, that it may not exist. Like the ivory-billed woodpecker, the Bachman's warbler is a phantom—restricted in range, poorly studied, and the dream find of intrepid birders.

The species was discovered in 1832 near Charleston, South Carolina, when the Reverend John Bachman found the first individual in a deep, dark swamp. The next year he collected a second specimen and gave them both to his good friend John Audubon. The famous artist named the new species and reported that several other individuals had been seen in the same vicinity. Then the species vanished. While some Bachman's warblers were observed wintering in Cuba in the 1850s, none were seen in North America for 63 years.

Finally in 1896 a Bachman's warbler was found near Lake Pontchartrain, Louisiana. A year later the first nest was discovered in southeastern Missouri, and during the next decade more nests turned up in Arkansas, Kentucky, South Carolina and Alabama. From 1900 to 1920 the birds were considered common in some areas. Then the species vanished again; no nest has been found since 1938, and no birds have been seen on breeding territory since 1963.

What caused the warbler to disappear? Ornithologists usually point to destruction of the bird's breeding habitat—forests adjacent to rivers—but this explanation is not entirely convincing. While these forests are disappearing at an alarming rate, and some birds that inhabit them, such as hooded and Swainson's warblers, appear to be declining, no species has disappeared like the Bachman's.

But one component of the riverine forests has disappeared almost as completely as the warbler: giant stands of bamboo or "canebrakes." A hundred years ago these were extensive in the Southeast. Teddy Roosevelt wrote that on the Tensas River in northeastern Louisiana, "canebrakes stretch along the slight rises of ground, often extending for miles, forming one of the most striking and interesting features of the country." Today all but a few patches are gone, eaten by cattle, cleared for agriculture, and reduced by control of fire and floods, which bamboo needs to thrive.

Ornithologist J. V. Remsen, Jr. of Louisiana State University believes that the absence of cane may be related to the disappearance of the warbler. He points out that virtually every account of Bachman's warbler nesting habitat in the scientific literature mentions the presence of cane. The warbler's restriction to cane habitat also would help to explain why few birds were ever found nesting, even in years when many were seen on migration. "Not only are canebrakes located in swamps with difficult access," Remsen writes, "but cane thickets themselves are nearly impenetrable" ("Was Bachman's warbler a bamboo specialist?" *The Auk,* Vol. 103, pp. 216–219).

Remsen's explanation for the Bachman's warbler decline may be correct, but other factors should be considered as well: habitat destruction on wintering grounds, overcollecting, and hurricanes. These are discussed in a new book by Paul Hamel, *Bachman's Warbler: a Species in Peril* (1986, Smithsonian Institution Press, Washington, D.C., 109 pages, $11.95, paper). This book is a clearly written, semi-technical report that summarizes virtually everything known about the bird, including information collected from the dusty field notes of long-forgotten ornithologists.

If you're one of those intrepid birders bent on finding the elusive warbler, Remsen's article and Hamel's book are required reading. Be forewarned—they point to a steamy trip into impenetrable southern thickets infested with ticks, chiggers, mosquitoes, and cottonmouths. Good luck!

New Book

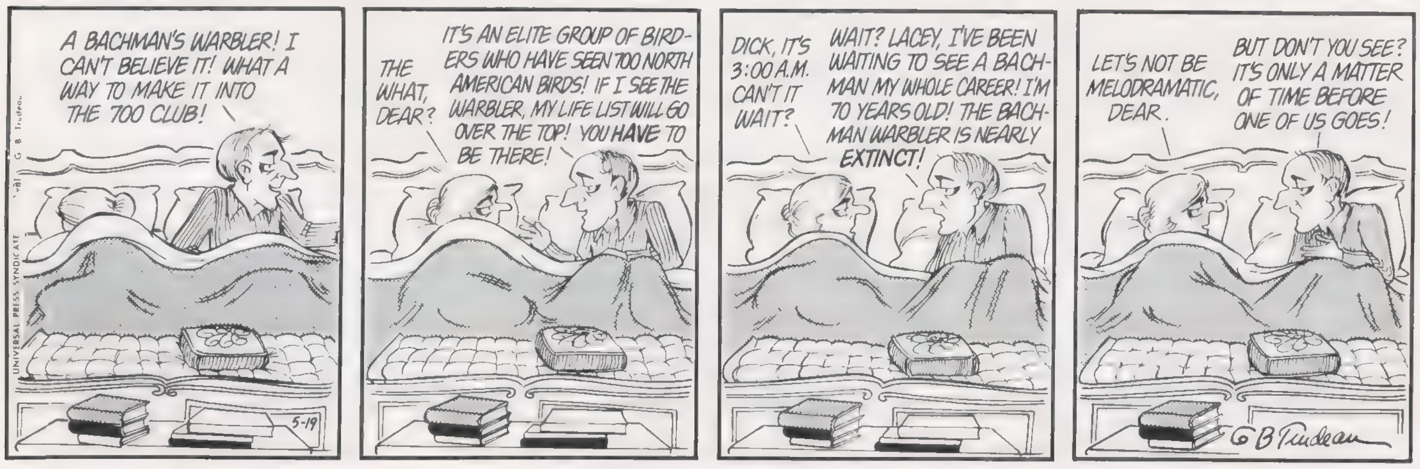
Life of the Woodpecker by Alexander F. Skutch. Illustrations by Dana Gardner. 1985. Ibis Publishing Company, Santa Monica, California. 144 pages. $49.95 (cloth).

This is a wonderful book, and a curious one. At first glance it looks like a coffeetable book and, should you purchase it, you'll be proud to display it in your living room.

Nevertheless this is a book meant to be read. Skutch is a rare breed, a knowledgeable scientist who writes with charm and grace. "A bird that uses its head as a hammer to drive a chisel-like bill into solid wood appears to jeopardize its brain. One might expect such a bird to be stupid and inflexible in its behavior," he writes in the preface.

But woodpeckers are neither stupid nor inflexible, as Skutch explains in chapters on food, dwellings, displays, and social life. Writing of his own observations as well as those of other ornithologists, Skutch details woodpeckers' lives in a painless manner. The book discusses many of the approxi-

DOONESBURY **by Garry Trudeau**


A BACHMAN'S WARBLER! I CAN'T BELIEVE IT! WHAT A WAY TO MAKE IT INTO THE 700 CLUB!
THE WHAT, DEAR?
IT'S AN ELITE GROUP OF BIRDERS WHO HAVE SEEN 700 NORTH AMERICAN BIRDS! IF I SEE THE WARBLER, MY LIFE LIST WILL GO OVER THE TOP! YOU HAVE TO BE THERE!
DICK, IT'S 3:00 A.M. CAN'T IT WAIT?
WAIT? LACEY, I'VE BEEN WAITING TO SEE A BACHMAN MY WHOLE CAREER! I'M 70 YEARS OLD! THE BACHMAN WARBLER IS NEARLY EXTINCT!
LET'S NOT BE MELODRAMATIC, DEAR.
BUT DON'T YOU SEE? IT'S ONLY A MATTER OF TIME BEFORE ONE OF US GOES!
5-19
G B Trudeau

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LEONARD LEE RUE III (PHOTO RESEARCHERS, INC.)

Hawks that appear to be playing may actually be deadly serious.

mately 200 woodpecker species found worldwide, and includes 62 beautiful paintings by Dana Gardner.

Life of the Woodpecker is the only popular book to deal with this bird family and, while the price is steep, the product is quality. "[Woodpeckers] are the original drummers, who sent their stirring rolls resounding through the air long before man invented drums and drumsticks."

Play with Prey?

A bird's life is hard work but may include some play, too. Ornithologist W. H. Thorpe once kept young captive gannets that were "as playful and mischievous as a litter of puppies." Ravens play "king of the hill" as one bird stands on a mound brandishing a stick while another bird attempts to take it away, and Adelie penguins ride moving ice floes, then swim back to their starting point to ride again for no apparent reason.

Play may serve a purpose for birds just as it does for humans. When young birds attack objects, mock fight, or drop sticks in midair and recapture them, they develop coordination and social skills needed for hunting, territorial defense, courtship and mating.

Some behavior that appears playful, however, may actually be deadly serious. This is the conclusion of Simon Fraser University's Nicolaas Verbeek, who has examined numerous reports of accipiter hawks that pursued other birds in a seemingly playful manner ("Behavioural interactions between avian predators and their avian prey: play behaviour or mobbing?" *Z. Tierpsychologie,* Vol. 67, pp. 204–214).

Dozens of these reports appear in the scientific literature. One ornithologist described a sharp-shinned hawk randomly striking at chickens, sending them running for shelter. Other researchers have watched sharp-shinned hawks and European sparrowhawks make "half-hearted" pursuits of flickers and other woodpeckers. Verbeek himself had seen Cooper's hawks listlessly attack yellow-billed magpies. These and similar incidents have been interpreted as game playing on the part of the attacker.

Verbeek offers another interpretation. Noting that the "playful" hawks were mostly young birds, and that their "victims" were usually large birds, he suggests that the hawks were not playing but were very hungry. Because of their inexperience, however, they selected prey too large to handle.

Verbeek does not suggest that birds never play. His study casts new light on an old interpretation, though, and underscores the danger of drawing parallels between the behavior of humans and other living creatures.

Roosting Riddle

Winter brings frigid temperatures, swirling snows and, in many areas, huge flocks of roosting birds. Why do some birds, which are solitary in summer, rest or sleep in large groups during other seasons?

Ornithologists have suggested two reasons. First, birds roosting in flocks may be safer from predators than birds roosting alone. Second, birds in flocks may be more efficient at finding food because individuals can "share" information about good foraging locations: birds that have discovered an abundant food source—for example, grain in a newly harvested field—can lead other birds to the area.

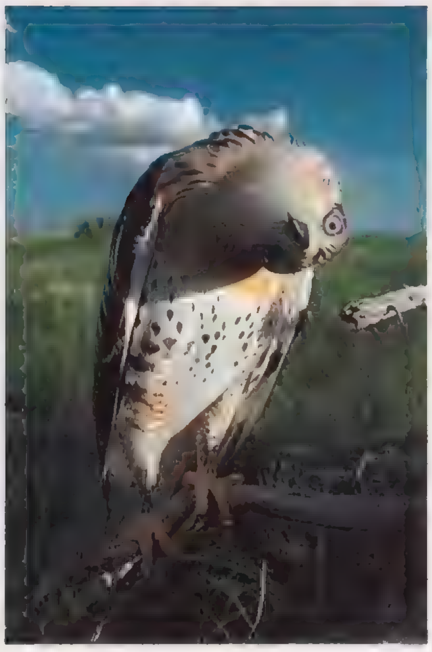
Ecologists have argued the validity of these ideas for several years, and each has its share of supporting evidence. Recently, however, a new thought has come from Carleton University's Patrick Weatherhead and Drew Hoysak, who suggest that birds may roost for both reasons ("Dominance structuring of a red-winged blackbird roost," *The Auk,* Vol. 101, pp. 551–555).

Weatherhead and Hoysak studied an autumn roost of male red-winged blackbirds in a cattail marsh near Ottawa, Ontario, and found that the youngest birds in the flock were subordinate to their elders. Older birds were more aggressive, exposing their red shoulder patches more frequently and chasing the youngsters. Furthermore, older birds were more likely to occupy the central portion of the roost, while young birds were relegated to the fringes.

Based on these observations, the researchers suggest that different-aged birds come to the roost for different reasons. The older males receive protection; by dominating young birds and occupying the central part of the roost, older birds are buffered from predators such as cats and raccoons. Young birds may tolerate the dangerous conditions, though, because they benefit by following older and more experienced birds to good feeding locations.

More studies are needed to investigate the idea further. Nevertheless, this study is a reminder that there is often no one simple reason for phenomena observed in nature.

—**Richard E. Bonney, Jr.**



Right Bird, Wrong Word

The picture of the hawk on the back cover of your autumn 1986 issue is cute, but it is not a Swainson's hawk as the caption stated. It's an immature, light-phase ferruginous hawk. Note the large mouth and the legs, which are feathered all the way down to the toes.

Great picture otherwise.

Phyllis R. Dague
Ithaca, New York

We need you hawk-eyed readers to keep us honest. Thanks!

More than 5,000 excellent recordings recently were added to the Laboratory's Library of Natural Sounds (LNS). Last fall LNS received the entire collection of the late William Gunn—3,500 superb cuts, including sounds of most North American species. Gunn was one of the world's top field recordists and worked with LNS on many projects, including the recent two-record set, *Warblers of North America*.

In addition to the Gunn collection, last summer LNS received hundreds of recordings from South America and Asia. Field recordists Ted Parker and Tom Schulenberg from Louisiana State University added more than 1,650 South American recordings, including many species new to the collection and about 300 from previously unrecorded regions in the Andes of Peru and Ecuador. Also, recordists Arnoud van den Berg and Cecilia Bosman of the Netherlands added 900 recordings from Southeast Asia, primarily Java and Malaysia. Together these sounds bring the LNS collection to 55,000 recordings of more than 5,000 bird species.

In August, LNS received a three-year grant of nearly $300,000 from the National Science Foundation for curating the sound collection and upgrading the studios where the tapes are edited and catalogued.

U.S. Fish and Wildlife Service has announced that it will phase out use of lead shot by waterfowl hunters. The ban will prevent further deaths of waterfowl and bald eagles due to poisoning from ingesting lead shot. As of 1985, 115 eagles were known to have died from lead poisoning. The ban will begin in the 1987–88 waterfowl season in areas of high hunting concentrations. By 1991 it will be illegal to use lead shot anywhere in the U.S.

Northeastern Bird-Banding Association voted last year to change its name to the Association of Field Ornithologists (AFO). The group will continue its quarterly publication, the *Journal of Field Ornithology*, but will expand its membership and programs from the Northeast to the entire continent. The Laboratory of Ornithology will host AFO's next annual meeting on May 1–3, 1987 at Cornell's Arnot Forest near Ithaca, New York.

National wildlife refuges are suffering from toxic waste problems, according to a U.S. Fish and Wildlife Service report released last year. Eighty-five of the nation's 434 refuges have potential contaminant problems. Contaminants include pesticides, PCBs, asbestos, selenium from irrigation drainage, and heavy metals such as mercury.

Clean-up work has begun at one of the most contaminated refuges, Wheeler, near Huntsville, Alabama. Sediment in the Tennessee River in and around the refuge contains between 1.5 and 8.0 million pounds of DDT compounds dumped between 1947 and 1970 by an upstream pesticide manufacturer. Cleaning up the Wheeler refuge, which supports 80,000 ducks and geese each winter, is expected to take three years and to cost $22-million.

Bird Population Studies has been chosen as the new name for the Laboratory's Cooperative Research Program. The name was suggested by Sada L. Clarke of Richmond, Virginia, and was among 90 entries submitted in our naming contest. Ms. Clarke received a $25 gift certificate to the Crow's Nest Bookshop for her winning suggestion.

The Cooperative Research Newsletter also has been renamed. The annual publication will now be called "Birdscope," and will feature news from all Laboratory programs—Bird Population Studies, Bioacoustics Research Program, Seatuck Research Program, and more. The next issue will be published this summer.

R. Todd Engstrom joined the Laboratory staff last fall as a Bird Population Studies biologist. Todd recently completed a Ph.D. at Florida State University, where he studied the breeding biology of red-winged blackbirds by analyzing 18,000 of the Laboratory's nest record cards. His responsibilities will include managing Bird Population Studies' Colonial Bird Register and conducting further research using nest record cards.

The Living Bird, the Laboratory's annual journal for 19 years, has become a collector's item. A leading publication in ornithological research, it combines technical articles and exquisite colorplates. The Laboratory is now offering a limited number of complete sets (some imperfect) of *The Living Bird* to our members. Cost: $1,000. Mail your request and check or money order to Library, Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850.

Free to Laboratory of Ornithology members—"Avian Rounds"—a semi-annual newsletter dealing with the care and treatment of wild and caged birds. The newsletter, published by the New York State College of Veterinary Medicine at Cornell University, is available by contacting the editor, "Avian Rounds," Schurman Hall, New York

State College of Veterinary Medicine, Cornell University, Ithaca, New York 14853. Telephone: (607) 253-5454.

Pan-American Shorebird Program, supported by the World Wildlife Fund, has been tagging shorebirds and needs you to report observations of tagged birds. Last year colored flags were placed on the legs of sanderlings, red knots, ruddy turnstones, black-bellied, semipalmated, and piping plovers, and white-rumped and semipalmated sandpipers at sites in North and South America. For each bird spotted, please report the species, flag color, location of sighting and date to: Pan-American Shorebird Program, Academy of Natural Sciences, 19th and the Parkway, Philadelphia, Pennsylvania 19103.

Christopher W. Clark, an assistant professor at Rockefeller University, has been selected as director of the Laboratory's new Bioacoustics Research Program. Chris has been studying animal sounds for years—analyzing whale sounds, and following the development of bird song from fledgling to adult.

Chris was selected by a faculty committee from Cornell's departments of Engineering, Psychology, Anthropology, Linguistics, Music, Neurobiology and Behavior, as well as the Laboratory. These departments will continue to participate in the program as research begins later this year.

Dear Member:

It seems like yesterday that the first issue of *The Living Bird Quarterly* rolled off the press. Actually it was nearly five years ago, and you're now looking at the first issue of Volume 6! Anniversaries cause one to reflect, and lately the editors and I have been taking a hard look at the magazine—weighing accomplishments, analyzing shortcomings, and looking toward the future.

The last year in particular was a good one. We added two columns, "Watching" by Donald and Lillian Stokes, and "A Birder's Notebook" by Michael Harwood. We published articles on feeding and attracting birds, on bird watching travels, and on bird art, biology, and conservation. We also won three awards from CASE, the Council for Advancement and Support of Education—gold medals in both the magazine publishing and special audience publication categories, and a bronze medal for visual design.

We're proud of these accomplishments but at the same time we wonder how our readers view the magazine. After all, it's published for you. We do hear from Lab staff and board members: "more articles on bird feeding, on building bird houses, on bird watching!" But we seldom hear from members. Would you like more news of the Lab? Travelogues? Reviews of birding equipment—binoculars, scopes, cameras, field guides? Would you like to see an expanded *Quarterly* with advertising?

I asked for your suggestions a few issues back, in this very space. We were grateful to receive some letters of praise and a few good ideas, but we'd like to hear more specific comments.

So this time we're not going to let you off easily. Several of you have recently received a questionnaire about the *Quarterly*; others will soon. It's short and won't take much time to fill out. Please do. Your comments will help us evaluate the magazine and help to shape its future.

And if you don't receive a questionnaire but do have comments, send them to me anyway. I guarantee that we will read and consider them carefully. We really care what you think.

CHARLES WALCOTT, Executive Director

Join us in June for three exciting Laboratory-sponsored field courses. Our classroom will be Cornell's 4,000-acre Arnot Forest near Ithaca, New York, summer home for nearly 80 species of birds including ravens, red-shouldered hawks and barred owls.

Field Ornithology, offered May 31–June 6, 1987, will hone your skills of bird observation and identification through the integration of field marks, songs, and habitat cues. Lectures and discussions will emphasize principles of animal behavior and ecology which can be applied to bird study anywhere in the world.

Natural Sound Recording, offered June 6–13, is a unique course that will teach state-of-the-art techniques for recording sounds of wildlife through many hours of hands-on experience. Topics include selection of recorders and microphones, recording theory, species recording, survey recording, ambient recording, and recording in different habitats.

Nature Photography will be offered June 14–20. Many aspects of natural history photography will be discussed, from photographing birds at nests to taking close-ups of flowers and insects. Students will be encouraged to complete various photographic assignments, and the results will be viewed and critiqued during evening sessions.

Each course is $425, and includes all food, lodging, class materials, and instruction fees from Sunday evening through Saturday morning (Saturday through Saturday for sound recording). Course enrollment is limited, and available on a first-come, first-served basis. See inside wrapper on this issue for further information and enrollment application.

—Steven C. Sibley

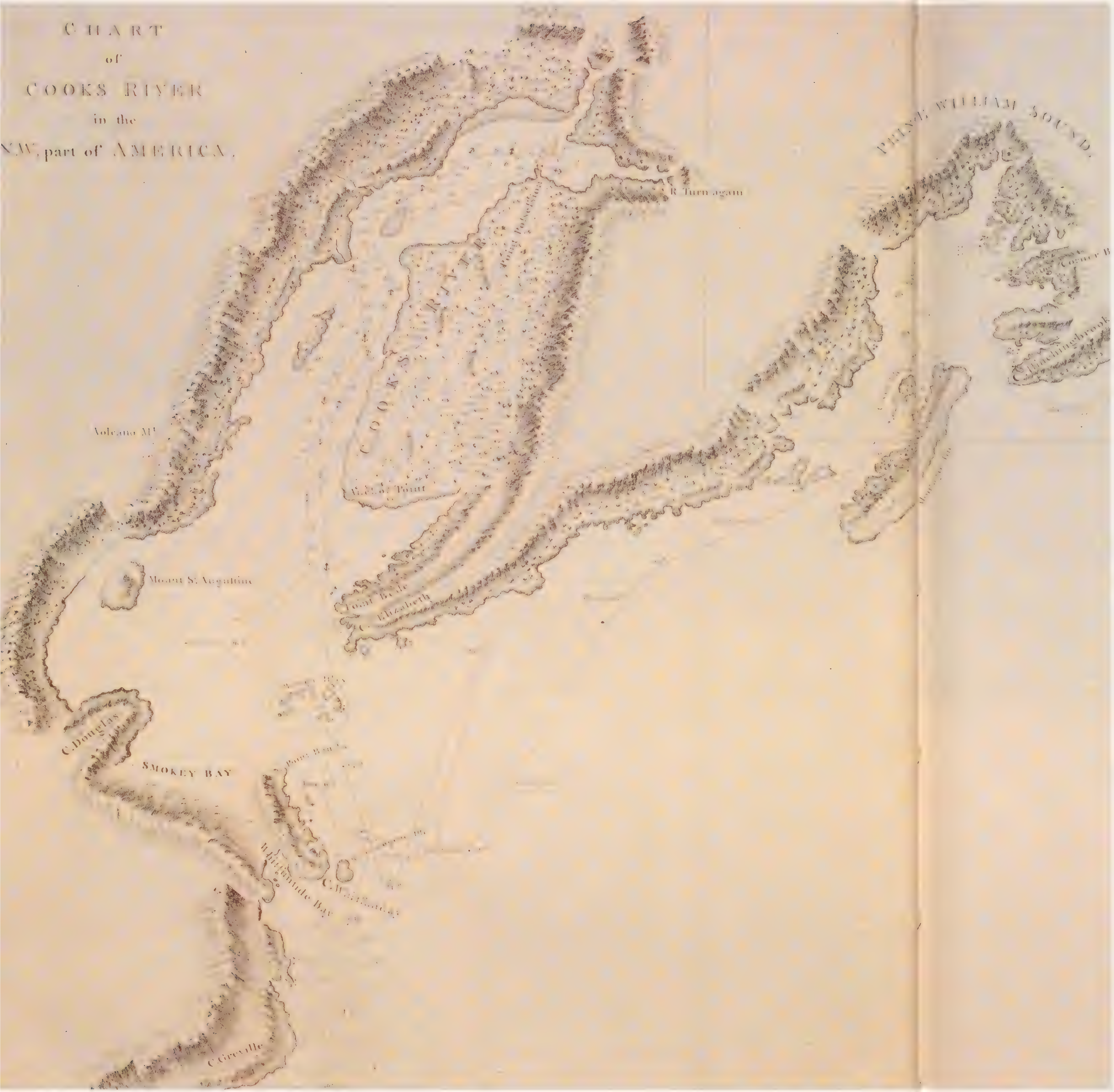
IT TAKES MORE THAN WORMS TO KEEP A ROBIN HOPPING

The Laboratory of Ornithology needs a well-rounded funding diet to keep it alive and healthy—membership dues, cash contributions, gifts of equipment. In addition, the Lab thrives on other forms of income, including gifts that may be financially advantageous to the donor as well as the Laboratory. Consider gifts of long-term appreciated securities, and gifts of closely held stock.

By giving such gifts you may obtain immediate cash benefits through tax savings and you can avoid capital gains taxes. If you have owned your securities for more than six months, you may claim a charitable gift tax deduction for their full market value, rather than their original cost.

To learn more about these gifts, please contact: Scott Sutcliffe, Office of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607) 255-4288.

Courtesy Department of Rare Books, Cornell University Libraries



Mother Carey's Chickens

NATHANIEL T. WHEELWRIGHT

A storm-petrel colony at night resembles an elementary schoolroom with the lights out. The air is a hugger-mugger of invisible bodies. In the dark storm-petrels completely lose their daytime wariness. Squealing nasally, the birds collide with the muffled sounds of chalk erasers clapped together. From graceful flight, they land awkwardly and waddle on webbed feet like children in oversized galoshes. Some prance in front of their burrows, rearing back their heads and braying. If you sit still one may climb on your back and take off from your head.

I first met storm-petrels in a misnamed place—the Barren Islands in Cook Inlet, off the coast of Alaska. When I arrived the islands were famous for their rich seabird life, but Captain James Cook, who discovered the islands 200 years ago, saw them from a different point of view. During his 1778 exploration of the Alaskan coast, gale winds forced him into the lee of a cluster of bleak islands. In his diary he cursed the violent storms that interrupted his search for a northern passage to Europe and slowed his escape from "this dreary part of the globe." He named the archipelago the Barren Islands because of its "very naked appearance."

Had Cook stayed until summer he would have learned that the islands come alive with a million seabirds. Glaucous-winged gulls breed in noisy colonies on the high peaks, and common and thick-billed murres nest on inaccessible ledges. Three cormorant species—double-crested, pelagic, and red-faced—inhabit the sheer cliffs. Horned puffins nest in rock fissures while pigeon guillemots, parakeet auklets, and ancient murrelets nest in isolated crevices and tunnels near the water.

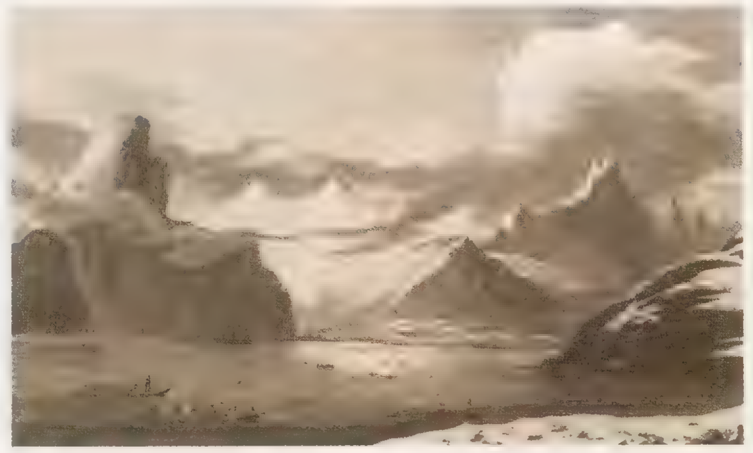
Tufted puffins paddle through the air on stubby wings, their orange feet dragging like flags. Clumsy fliers, the puffins are easy prey for peregrine falcons which punch them out of the air with fisted talons, or for bald eagles, which snatch them from in front of their burrows.

Then there are the fork-tailed storm-petrels, robin-sized relatives of albatrosses, whose evolution has been heavily influenced by the isolation, weather, and icy water that discouraged Captain Cook. Although two centuries had passed since the explorer had brought the first specimens back to England, very little was known about the birds' biology when I journeyed to the Barren Islands with my wife, Genie, and Dee Boersma, an ecologist from the University of Washington.

We did know a few things about fork-tailed storm-petrels. They occupy a broad range that extends from the coast of northern California through the Aleutian Islands and across the north Pacific to the Kuril Islands and Japan. Mariners called them Mother Carey's chickens, perhaps after Mater Cara, the Mother Beloved. Not that sailors welcomed the birds which clustered around ships in rough weather—these harbingers of storms were said to carry the key to Davy Jones's locker. Drowned sailors supposedly were consigned to the bodies of storm-petrels, forever to wander the ocean.

The family name of storm-petrels, Hydrobatidae, means "water-walker," and the genus name, *Oceanodroma,* means "running over the ocean." "Petrel" apparently refers to St. Peter, who walked the stormy sea at Galilee. Indeed, storm-petrels dangle their feet in the ocean, pattering just above the waves while hunt-

Captain Cook's 1778 journey took him along the Alaskan coast to the Barren Islands and other dismal places such as Snug Corner Cove in Prince William Sound, below. During summer the whole area comes alive with a million breeding seabirds.



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D. ROBERSON

FRANCOIS GOHIER (ARDEA PHOTOGRAPHICS)

ing for their main prey, a shrimplike crustacean called krill. Storm-petrels in turn serve as prey for numerous predators. Smaller than most seabirds, storm-petrels are bite-size for river otters, gulls, ravens, falcons, and eagles.

We also knew something about storm-petrel nesting behavior. Breeding birds that are not sitting on eggs spend their days foraging far from the breeding colonies, returning after sunset to relieve their incubating mates. We knew that birds which are relieved depart on their own foraging trips before dawn. They come and go during the darkness of a northern night just a few hours long, thereby avoiding encounters with diurnal predators. The fork-tail's only defense is to regurgitate a shot of apricot-colored oil into an attacker's face—an unpleasant maneuver which may discourage a gull or falcon.

Early in the study Boersma discovered something new. Foraging fork-tails don't always return to relieve their mates. Nevertheless, incubating birds may still leave. In fact they sometimes abandon their nests for days at a time, leaving the eggs alone in burrows as cold as refrigerators. Apparently parents don't always coordinate their shifts at the nest. Such "child abuse" would be lethal for the eggs of most bird species, yet neglected storm-petrel eggs usually hatched, sometimes after seven straight days of neglect. We decided to take a closer look at the birds' breeding biology to find out how their eggs were affected by neglect.

Fork-tailed storm-petrels nest underground. Finding nests is easy in spring, but by June the fescue grass, cow parsnip, and false hellebore obscure the nest entrances. Just large enough to permit a hand, they lead to muddy tunnels that may extend an arm's length into the ground. At the end is the nest, a cold flat place covered with a few bits of straw. There the female lays a single egg. At first we felt uneasy sticking our arms into dark holes in the ground, but after three months of checking nests every day, we learned the intricate path of each burrow, and no longer jerked when incubating storm-petrels nibbled our fingertips.

After monitoring nests for several weeks we discovered that abandonment of nests for days at a time was the rule among fork-tailed storm-petrels, not aberrant behavior of a few inept parents. Every pair in the colony neglected their egg at least one day. On a given day, half of our study nests might be unattended while both parents foraged far out at sea. Apparently, embryos ceased to develop when they weren't being incubated, with the result that one day of neglect added about one day to the incubation period. Faithful incubators hatched their eggs in about 40 days while inattentive incubators spent up to 70.

Even though most eggs finally hatched, sporadic incubators paid penalties: hatching success declined with increasingly irregular incubation. Because the extended incubation delayed hatching, late-emerging fledglings had to learn to forage in severe fall storms. And chicks produced from neglected eggs weighed less and were more likely to die a few days after hatching than chicks from regularly incubated eggs.

N. WHEELWRIGHT (2)

Who's minding the egg? Far out at sea a fork-tailed storm-petrel forages, daring to return to its breeding colony only under cover of darkness when it's safe from predators such as hungry river otters, below left. Meanwhile back at the nest, its single egg may remain unattended for days. Nevertheless it usually hatches, producing a chick that also can survive several days alone. Below, Genie Wheelwright weighs a young chick to see how fast it's growing.

We decided to learn more about how egg neglect affected developing embryos by artificially incubating 40 eggs, keeping them at a temperature of 98 degrees Fahrenheit—the incubation temperature of most bird species—while also exposing them to varying numbers of days of "neglect" at about 50 degrees, the average temperature of storm-petrel nest burrows. None of the eggs hatched.

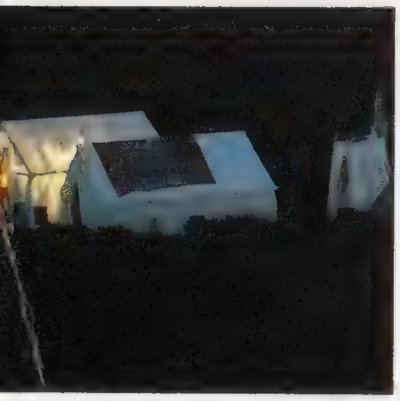
We're not sure, but have suspicions why our experiment failed. It may have been the hot temperatures, not the cold ones, that killed the embryos. When we later measured the temperatures of artificial eggs being incubated in storm-petrel nests, we found that the warmest eggs were under 86 degrees. And when we measured unattended eggs that later hatched we found that temperatures averaged only 52 degrees, conditions that would kill most avian embryos within a few hours. Unlike most birds, fork-tailed storm-petrels apparently incubate their eggs at temperatures much lower than 98 degrees. In fact they may incubate at temperatures lower than those of penguins breeding on ice packs. But why?

From an ecological point of view, it makes sense for storm-petrels to have evolved cold-tolerant eggs. Breeding birds feed far from their nesting colonies, and their food is scattered in small patches across the vast ocean. The birds can return safely to the islands only during the brief Alaskan night, and if a bird misses one night, it must wait until the next to spell its incubating mate. Yet the incubating parent cannot afford to spend time keeping eggs warm at the expense of eating, so it is forced to desert its eggs.

Despite the neglect, most eggs hatch in July as tiny balls of matted gray down, looking like lost tennis balls uncovered by a spring thaw. Eyes closed, peeping constantly, the newly hatched chick drinks a soup of partially digested krill from the open bills of its parents. Unable to regulate its body temperature for a

Unlike storm-petrels, tufted puffins forage close to their breeding islands and return during the day, rarely leaving their eggs unattended. Nevertheless the Barren Islands present puffins with other challenges. Peregrine falcons punch them out of the sky, and bald eagles snatch them from in front of their burrows. Below, glowing tents confused some young storm-petrels which were venturing into the night for the first time.

PHYLLIS GREENBERG



TED SIMONS

week or so, it depends totally on its parents for warmth. Just as they neglect eggs, though, some parents also abandon their chicks. Although a hatchling can survive several days alone, its body temperature drops to one third of what it was when brooded by its parents.

After a few days the chicks' oily diet is upgraded to squid and small fish. The portions are irregular but substantial. Nestlings can nearly double in weight overnight, becoming as plump and soft as water balloons. Food stored in their bloated stomachs is insurance against nights when neither parent returns. At their peak, nestlings weigh nearly twice as much as their parents, who continue to visit the nest but deliver smaller and smaller rations.

In late August we prepared to leave the islands before the fall storms. The main wave of southward-bound migratory birds—warblers and pipits, sandpipers and phalaropes—had passed through a month earlier. The air was chill. Although nights were longer, nocturnal activity at the storm-petrel colony was subdued. Parents came and went quietly, delivering food to their giant chicks. Most would soon fledge. A few had just hatched and snow would probably seal them in their burrows before they were old enough to fly.

One cold night, after we had finished our customary dinner of canned chicken, freeze-dried mashed potatoes, and Krust-eze biscuits, we wrapped ourselves as usual in sleeping bags and began to read in our tent. To our surprise someone knocked at the door. I opened it to find a confused storm-petrel beating the tent with its wings. Apparently it was one of the first fledglings and had become disoriented by the blue glow of the lantern through the tent. Several more birds visited us in the next few nights, setting off on their own for the first time. Some ornithologists maintain that storm-petrel fledglings return three or four years later to breed in the same burrow in which they were raised.

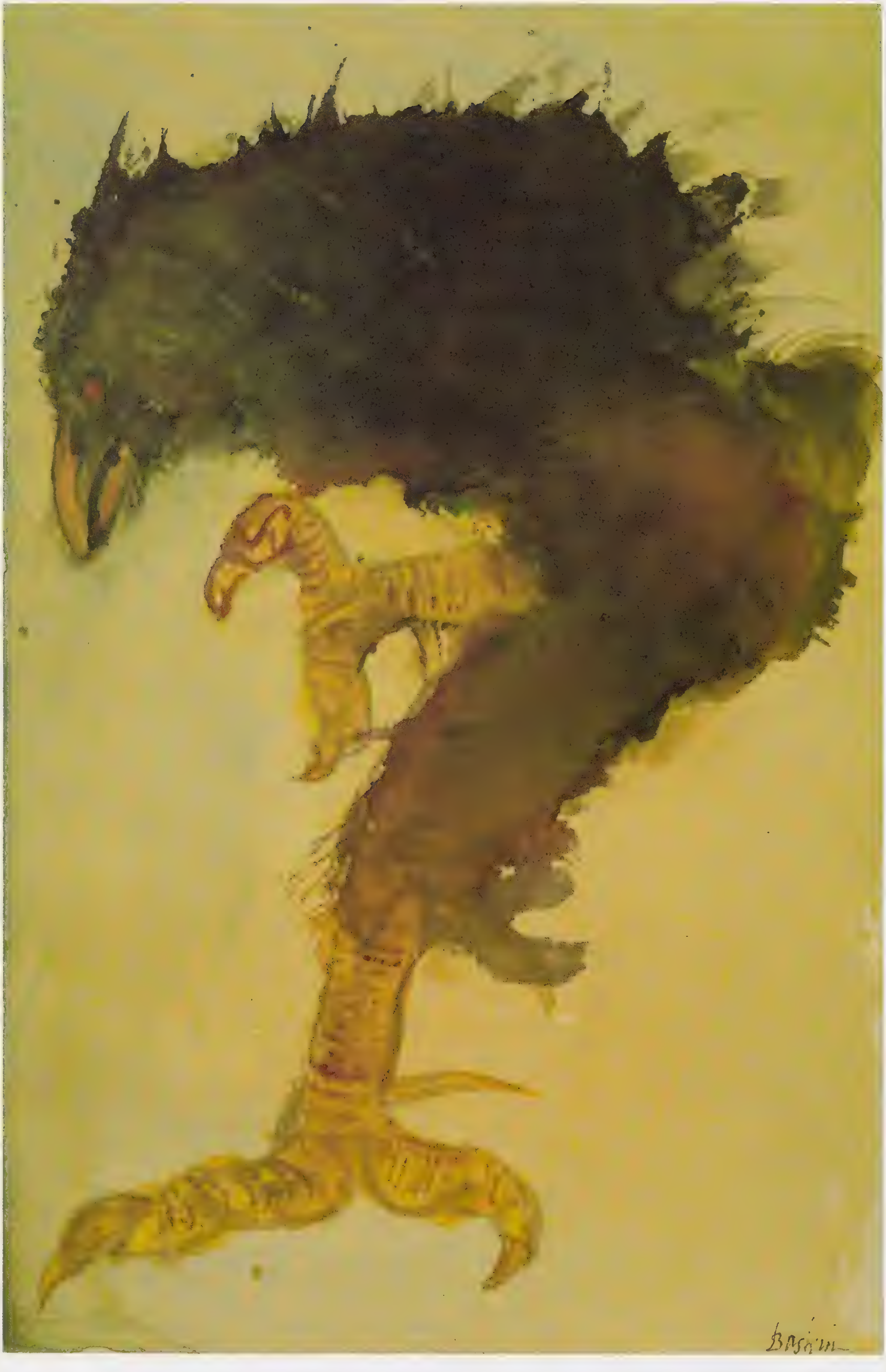
When breeding, the young storm-petrels will encounter the same hazards their parents faced—the predators on land, the brief nocturnal window of safe return to the colony, the patches of food scattered unpredictably across the ocean. Flying many miles against the wind through thick fog, carrying enough food for their incubation stint or for their hungry nestlings, they will be challenged with coordinating incubation shifts with a mate known only in the dark. Although some may live several decades, each year they have but a single chance to breed. The entire annual reproductive effort hangs on the fate of a single egg at the end of a cold, muddy tunnel. ☐

Nathaniel T. Wheelwright is an ecologist in the department of biology at Bowdoin College, Brunswick, Maine.

Further Reading

Lockley, R. M. *Flight of the Storm Petrel.* David & Charles, London. 1983.

Boersma, P. D. and N. T. Wheelwright. "Egg Neglect in the Procellariiformes: Reproductive Adaptations in the Fork-tailed Storm-Petrel." *The Condor*, Vol. 81, pp. 157–165 (1979).



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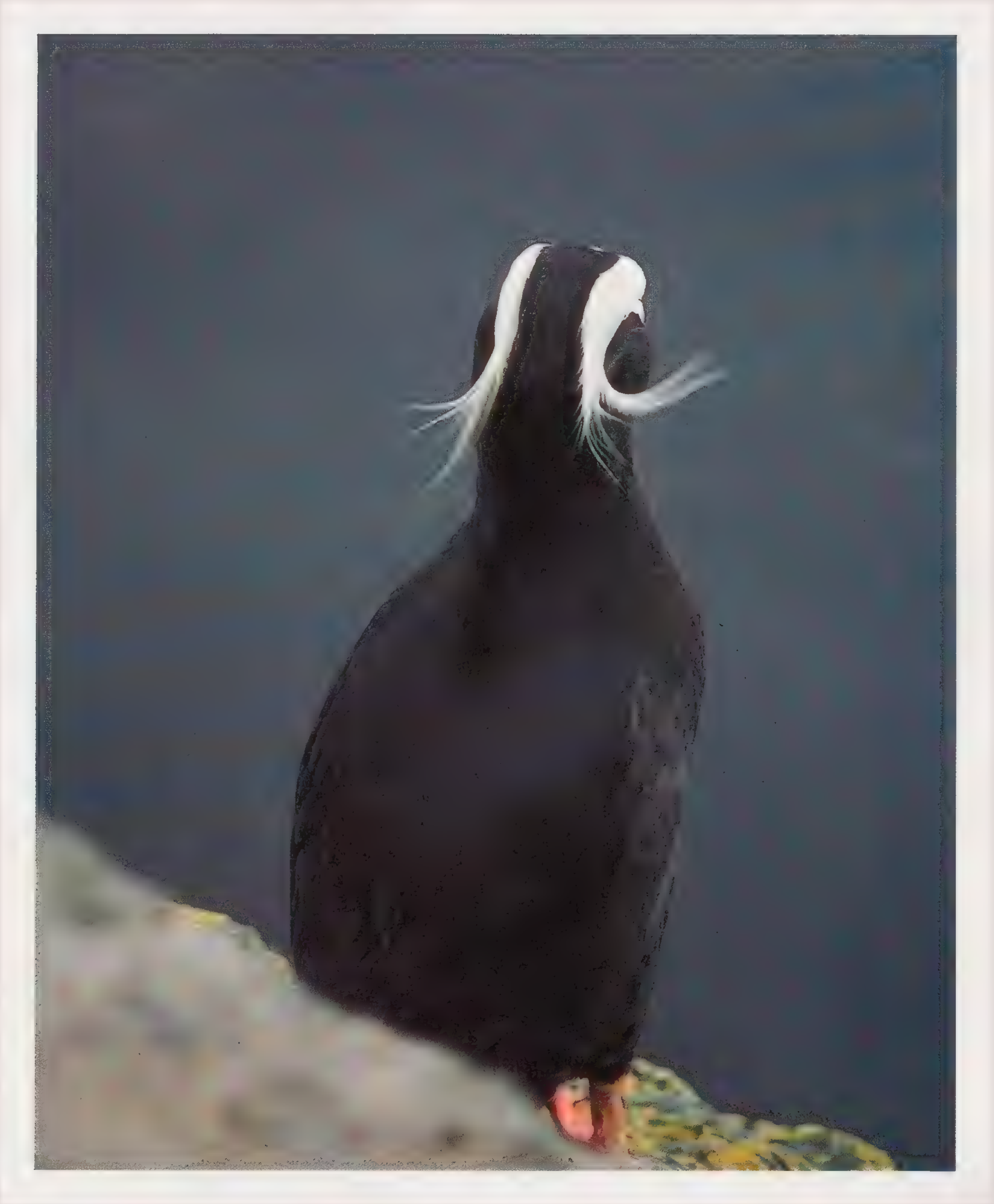

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Quarterly

Spring 1987

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4 **159 SAPSUCKER WOODS RD.**

5 **BIRDNOTES**

6 **A BIRDER'S NOTEBOOK** *by Michael Harwood*

Would you like to watch birds in total comfort? Try dream birding. No plane tickets, no tour fees, no hotel bills, no intestinal distress—and you don't even get cold or wet.

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Identifying an unknown bird is like solving a puzzle with pieces that can fly away. Birder Joan Lentz offers advice.

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"Pretty, pretty Rachel," sings the magnolia warbler. "Sweet, sweet, sweeter than sweet," the yellow warbler carols. "Pizza!" shouts the acadian flycatcher. Learning bird songs is easiest when you can translate them into English.

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Year-round pair bonds and long-lasting family ties help Canada geese compete and survive in a challenging world.

24 **THE ACID TEST** *by Rob Alvo*

Forty years ago Peter Peloquin built a fishing camp on the shore of beautiful Chiniguchi Lake in the Ontario wilderness. Now, acid rain has killed all the fish—which is bad for Peloquin's business and even worse for the common loon.

p. 6 *Dreaming about Birds*

Front Cover: Sora at Kern National Wildlife Refuge in the San Joaquin Valley, California. This member of the rail family nests in freshwater and brackish marshes throughout much of North America, and winters from the southern United States to northern South America and the West Indies. Photograph by Darrell Gulin. Thanks to Douglas M. MacCoy for his generous gift for printing our front cover. **Back Cover:** Outside–Assorted bird eggs from the collection of the Western Foundation of Vertebrate Zoology, Los Angeles, California. Photograph by Frans Lanting. Inside—Common loon and chick. Photograph by Peter M. Roberts, Wildlife Photography.

Greetings from India

I was pondering your reminder to renew my membership in the Laboratory of Ornithology and wondering whether to answer. I've made up my mind to inform you what I feel.

I have been a member of the Laboratory for a year and have enjoyed receiving *The Living Bird Quarterly*. Oh, what crisp and to-the-point descriptions! I love to receive the *Quarterly* to know what is going on.

It is a wonderful and patient job you people do for the winged creatures. I agree with you, that your successes tomorrow depend upon people like me who thoughtfully support the Laboratory today. Alas! I cannot continue for want of finance. My membership ($35 U.S.) is 400 Indian rupees—one-fifth of my monthly salary.

I beg your pardon for not being able to continue my membership. But I will always cherish that once I had the privilege of being a member of the Laboratory of Ornithology and reading *The Living Bird Quarterly*.

V. S. Velayudan
Tamilnadu, India

Condor Candor

Thanks for your article, "The Condor's Last Stand" (Autumn 1986). I believe that your summation of recent rescue attempts represents fairness to all parties involved. Such balanced treatment of the condor and its historic status is both needed and welcomed.

Now that condors are gone from the wild, attention must shift to the zoos which house the remaining living specimens. All people concerned about the condor must now work together to see that the species does not go extinct.

J. Richard Hilton, President
Society for the Preservation of Birds of Prey
Pacific Palisades, California

Amorphous Bird Club

Somewhat belatedly, Ben Gelman's "Birders I Have Known" (Summer 1984) has come to my attention. In it, he refers to the Sialis Bird Club. Your readers might be interested in the history of that organization, if that's what it is.

It started in the fall of 1933. Scoutmaster William Ephraim announced one Friday night that there would be a bird walk the following morning. A few Boy Scouts showed up, mostly out of curiosity. We went bird watching a few more times that fall and winter.

I think our interest solidified on Saturday, May 11, 1934. Back then, the New York Botanical Garden in Bronx Park was wide open. We got off the trolley car at Southern Boulevard and walked into the park at 5:30 A.M. There was a heavy mist, the last of a drizzle that had been going on most of the night. Conditions were perfect for a big migration wave since the birds were stacked up behind a warm front. As the sun came out, we saw warblers dripping from every tree. I have been looking for another such wave ever since and have yet to see one. I don't believe there are that many warblers anymore.

Scoutmaster Bill nourished our interest. Bird watchers were a small fraternity in those days, and we soon knew most of them, expanding our acquaintances beyond the original group of Boy Scouts. I do not remember when it occurred to us that we constituted a club. The name was invented by William Weber, a notorious punster, now an eminent botanist. *Sialia sialis* is the scientific name of the eastern bluebird, and for those familiar with German, the word evokes the idea that we see everything.

Sialis is a club with no meetings, constitution, bylaws, dues, or membership roster. Just who is a member is a matter of opinion. No doubt the core consists of the six men who have been bird watching together since that afternoon in 1933: William Ephraim, Bill Geigin, Larry Lehrman, Al Milch, John Philips, and Joe Orenstein. We still want to see everything and are trying to spread our interest in bird watching to some promising grandchildren.

Robert L. Lehrman
Bayside, New York

FROM THE DIRECTOR

Bird watchers have lots of company. According to a recent survey by Stephen Kellert at Yale University, one-quarter of the U.S. population watched birds during 1980! And more than 10 percent of the population watched birds on more than 20 days that year.

But how many of these people knew what birds they were seeing? Kellert's survey also shows that only 4 percent of the bird watchers used a field guide. What prevented the rest from using one?

One reason may be the complexity of most existing guides. For a beginner, opening a field guide can be an overwhelming experience. Say you've seen a little brown bird with a spotted breast. You want to know what it is. You open your field guide. There are dozens of little brown birds. On which page do you start?

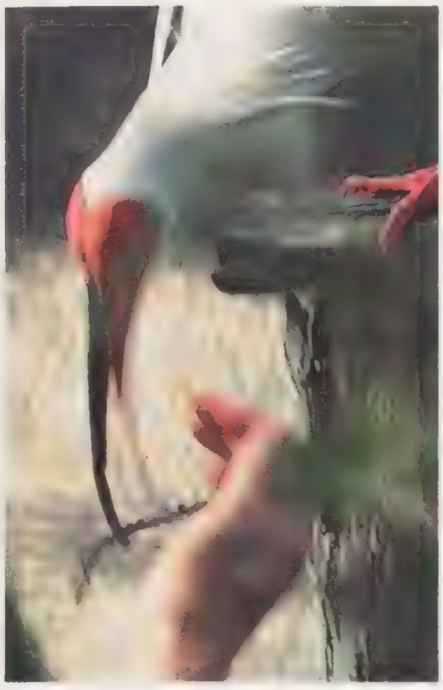
The Laboratory has undertaken three new projects to help beginners overcome field guide anxiety. First is two new guides being written by Steve Sibley, our assistant director of education. These books, one for eastern North America and one for the West, will be visual keys--they will use a series of paintings to help bird watchers identify an unfamiliar species. The illustrations are by well-known artist Alan Singer and the publisher is Bantam Books.

Second, the Laboratory is sponsoring two new Golden Guides to be published by Western Publishing. The author is Chandler Robbins, who also wrote *A Field Guide to the Birds of North America*. The new guides, one each for the East and the West, will contain 40 species of backyard birds. They will be inexpensive and widely available in supermarkets, hardware stores, and farm supply outlets, wherever bird food is sold.

Finally, we are collaborating with the McGraw-Hill Continuing Education Center to produce an innovative home-study course in birding and bird study. The course is being written by Laboratory Associate Steve Kress, author of *The Audubon Society Guide to Attracting Birds*. It will consist of a series of modules, each containing pages for a looseleaf field guide, field identification cards, cassette tapes of bird songs, text, and a project workbook. The course will be fun for individuals and families alike.

We hope that all three projects will help the thousands of folks who don't use field guides to begin identifying and learning about birds without becoming overwhelmed. We'll let you know as soon as the products are available.

CHARLES WALCOTT, Executive Director



INTERNATIONAL CRANE FOUNDATION

Crested ibis

Seven young crested ibises were raised in three wild nests in Shanxi Province, China, during the 1986 breeding season. The young birds raise the total known world population of wild crested ibises to 29, a substantial increase over the total population of seven birds in 1981 when the Shanxi nests were discovered. Before that discovery, the species was believed extinct save for three caged birds in Japan ("Ibises in Peril" and "Gem of the Orient," *The Living Bird Quarterly*, Spring 1986).

Despite the continuing success of the wild population, preservation of this rare ibis may be possible only through an intensive management program. A new crested ibis breeding center is nearly complete at the Peking Zoo, where two birds already live in captivity, and biologists at the Crested Ibis Research Station in Shanxi are intensifying research on the species' ecology.

Approximately 73 million ducks migrated south from their breeding grounds in Canada and the northern United States in autumn 1986, a modest increase over the 1985 fall flight of 62 million. This is good news because severe drought on breeding grounds had caused duck populations to decline each year from 1979 to 1985 ("Ducking the Issue," *The Living Bird Quarterly*, Spring 1986).

According to the U.S. Fish and Wildlife Service, the population increase in 1986 resulted in part from restrictive duck hunting regulations implemented during autumn 1985. Restrictive regulations continued during 1986, so the population may continue to grow. Biologists worry, however, that fall flights of 100 million ducks—common a decade ago—may never occur again. Destruction of wetlands, especially in the Midwest, has significantly reduced the breeding habitat available to North American waterfowl.

Did you know that birds have "accents"? Mary Anderson and Richard Conner of Stephen F. Austin State University and the U.S. Forest Service have studied the songs of three populations of northern cardinals in eastern Texas. They found that each population had a distinct dialect, even though they lived but a few miles apart (*Wilson Bulletin*, Vol. 97, pp. 436–449).

The dialects appeared to be related to habitat. Two of the populations lived in old forests with heavy foliage, and members of these populations sang simple songs with little pitch variation. The third population, however, dwelled in an open area with few trees, and its members sang songs with a wide range of frequencies.

Why should cardinals in open areas sing more varied songs than their forest-dwelling neighbors? Ornithologists have proposed that environment affects the transmission of bird songs. For example, songs carry clearly through open habitat, whereas heavy foliage can garble a bird's notes.

Therefore, Anderson and Conner conclude, cardinals may alter their songs according to the acoustic properties of their habitat. Forest inhabitants must sing simple songs that will not be distorted by reverberations from the canopy. Cardinals in open habitats, however, can take advantage of their favorable acoustic surroundings by singing complex songs that contain more information for other birds.

—*B. Silverman*

The Environmental Protection Agency (EPA) has canceled the registration of the insecticide diazinon for use on golf courses and sod farms. The cancellation results from increasing evidence that diazinon is hazardous to birds. In one incident, 700 brant died after eating grass on a New York State golf course treated with the chemical. Registration cancellation is the strongest action that EPA can take in response to unwanted pesticide poisonings.

AROUND THE LAB

The Laboratory welcomes four charter members of its new Corporate Associates Program: Exxon Corporation, The Williams Companies Foundation, Inc., E. I. du Pont de Nemours and Company, and S.C. Johnson and Sons, Inc. Yearly donations from these companies—between $5,000 and $25,000—will support our program in Bird Population Studies. In return, Corporate Associates will have access to our data on changing bird populations for use in assessing environmental effects of corporate operations. We are pleased to see enthusiasm for this new link between the Laboratory and the business world.

More than 100 completed questionnaires have been received from our *Living Bird Quarterly* readership survey mailed to 300 Lab members last winter. We are gratified by the response and by the fact that most respondents consider the magazine interesting, informative, and visually appealing. Director Charles Walcott will share specific results in the Summer 1987 issue.

A well-rounded funding diet is crucial to keep the Laboratory of Ornithology alive and healthy—membership dues, cash contributions, gifts of equipment. In addition, the Lab thrives on other forms of income, including gifts that may be financially advantageous to the donor as well as the Laboratory. Consider gifts of long-term appreciated securities, and gifts of closely held stock.

By giving such gifts you may obtain immediate cash benefits through tax savings and you can avoid capital gains taxes. If you have owned your securities for more than six months, you may claim a charitable gift tax deduction for their full market value, rather than the original cost.

To learn more about these gifts, please contact: Scott Sutcliffe, Office of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607)255-4288.

Dreaming about Birds

I should say at the start that I myself don't have dreams about birds, or at least none that I remember. Well, maybe one. In the middle of a summer night, years ago, I woke thinking I had heard a barred owl calling on the next ridge. I went to the open window and listened: nothing. That's typical of barred owls, of course, and typical of dreams, and there was no way of knowing which had waked me.

I can certainly think of situations in which I ought to dream about birds. For example, every spring for more than 20 years I've gone on at least one Big Day or Big Weekend, chasing birds—long lists of birds—through dark and daylight for 16 or more hours at a stretch. The birding is usually so exhilarating the only thing that can stop me even temporarily is complete exhaustion. But when I go to sleep at the end of such a day, with my mind's eye and ear full of birds, I seem to switch off the birds when I switch off the light.

I find that remarkable. Furthermore, the idea that I should or might dream about birds had never even occurred to me until a Sunday in the middle of last May, when the Professor and the English Lady and I were working on the back half of a Big Weekend, driving all over northwestern Connecticut to fill in the gaps in our list, and my companions started talking about bird dreams.

The Professor is particularly fond of "LBJs"—little brown jobs; he hates to pass a weedy field without first tramping all over it, flushing the sparrows hiding there. He often dreams about that sort of bird. They appear in such startling clarity and color, he tells me, *Audubon* "doesn't have photographs better than my dreams."

He also has a recurring dream having nothing to do with dickeybirds. In it he is standing on a curved plain (as if the planet had shrunk, increasing its surface curvature), and seven or eight huge cranes with astonishingly long outstretched necks and legs are gliding in slow motion high overhead across a brilliant blue sky. They are not all the same species of crane, but most are white with black wingtips, and he can see red on their heads. The dream is extremely beautiful and exciting, says the Professor, and "when I wake up I almost put the cranes on my life list!"

Dreams offer opportunities to listers that aren't available in a waking state.

Some of the hotshot birders and academic ornithologists in the audience are now nodding their heads and noting dryly that a lot of life lists contain more than a few dream birds. But I can go them one better: What about life lists of dream birds only?

It was the English Lady who opened my eyes to that possibility while we were looking for elusive warblers and woodpeckers last May. She claimed we had mutual friends who actually kept such lists. So I made further inquiries of people she had mentioned.

"That's right," said an assistant professor of biology at a community college in western Connecticut, a good birder whose waking life list exceeds 600 species. "My wife and I keep a dream list together. We've been doing it for about 10 years. We must be up to 180 by now. I just added great crested flycatcher the other day. I dreamt I was in southern Illinois during the fall migration; the bird flew down out of a tree, and I got a good look at it."

Apparently one can't just go to bed and dream a particular bird on purpose, to fill a gap in the list. But outside influences do affect the dreams. I talked with a friend one night about an article I was writing on the ivory-billed woodpecker; a few nights later, he told me, he dreamt he found one.

Most dream birds seem to be less exotic than that—familiar, easily recognized local species, birds that over a long period of time have carved paths into the unconscious, whence they appear in dreamland. Another factor that brings certain birds flying into dreams is anticipation. "I dream more when I'm preparing for a trip, reading the bird books, making flash cards and so on," said one dream lister. As the date approaches for an important local Christmas Count, another lister dreams about the exciting birds he's likely to find.

"Robins, great horned owls, barred owls, that sort of thing, come up in my dreams a lot," he told me. He travels a good deal, and his waking life list is above 1,300 species, but he just got into this dream-listing business. He's up to about 70 species so far ("I've got a lot of work to do," he remarked), and his list already includes griffon vulture, blue-crowned motmot, spectacled owl, ruddy shelduck, and yellow-rumped tanager.

There's only one real trick to dream listing. Most memories of dreams evaporate within a few minutes, and though bird dreamers occasionally remember last night's dream bird in the middle of the day, usually they have to jot down the name right away, as soon as they wake up, or they lose the new bird. Of course, the American Birding Association's strict rules apply in this activity. "A lot of times the bird's identity isn't really clear," said a bird dreamer. "You have to get the outstanding field marks. Otherwise it doesn't count."

Dreams offer opportunities to listers that aren't available in a waking state. Every birder has had the experience of "identifying" a species, only to hear it sing or to see it from a different angle and realize it was something else. But if a bird changes identity while you're looking at it in a dream, you may get two birds for the price of one—"if you can identify them both," a dream lister added.

Dream birding also has no geographical limitations; one minute you may be looking at griffon vultures in Africa, the next, at Adelie penguins in Antarctica. To travel, the birder merely has to achieve

STEVE CARVER

dream sleep. No plane tickets, no tour fees, no hotel bills, no intestinal distress. "And it's great because you don't get cold or wet," one friend said—perhaps a bit wistfully. So far as he knows he goes birding only when he's awake.

I suppose we non–bird dreamers repress our memories of dream birds. The birds in dreams could be distressing portents and symbols, after all. Some psychiatrists and art historians, for example, claim that birds are common symbols for Mother, particularly the breast of Mother. Freud thought birds in dreams stood for sex, and other psychiatrists say that birds sometimes represent deaths. Any one of those topics could flick a sensitive person's memory switch to off.

Whatever the reason, it's a frustrating handicap, and maybe I should try to overcome it. I probably could if I concentrated. A friend who nets and bands birds seemed to have only vague memories of her bird dreams until we had talked about this at length. In yesterday's mail arrived the following note from her: "If it's of use to you I dreamt, just before waking today . . . , that I took two screech-owls, a tufted titmouse, a blue-gray gnatcatcher, a chipmunk and two cats (twins, brown-gray and white) out of a net. Had to stand on a stool to reach the gnatcatcher."

Wonderful. On the other hand, if I did make the effort there's a chance I'd find myself in an even more frustrating state: a dream limbo, a purgatory. The English Lady, who has just started a dream list, told me that for a long time she dreamt only about the *act* of birding and didn't remember any particular birds. That seems to be a common variation on the bird dream. One widely traveled birder said she couldn't remember the various species she's dreamt about because in her dreams she's always in another country, looking up an unfamiliar bird in a book.

I'm not sure I don't prefer the blank slate.

—Michael Harwood

Name That Bird

JOAN EASTON LENTZ

THE phone rang just before midnight. "Is this Joan Lentz? I have a question! Two birds are squawking their heads off in the backyard. I can't find them with a flashlight. Any idea what they are?"

Another query a few days later:

"Joan? Hi! I have a bird on my lawn with no field marks! It's completely brown all over and hops around in the dead leaves on the ground. What could it be? It's so drab."

Then there was the woman who came to bird class early. She hurried over anxiously, field guide in hand, her face a picture of puzzlement.

"Do woodpeckers ever go down tree trunks headfirst? Yesterday I saw a small bird heading down the bark of an oak tree. But I didn't have my binoculars, so I couldn't get a good look."

As an avid birder and teacher of bird-watching classes, I enjoy helping beginners with their "mystery" birds. I've been watching birds since I was ten years old so it's hard for me to find species I haven't yet seen. But I can still recapture the thrill of finding new birds by introducing beginners to the excitement of birding.

To me, identifying a bird is like solving a puzzle. Many simple pieces of information must be fitted together before you recognize the whole bird. Of course, there's a special challenge: your subject can fly away before you've had time to gather all the information.

How do you identify birds in the field? I suggest using the following five clues: *silhouette*—shape and size; *plumage*—patterns of color which form field marks; *behavior*—manner of perching, flying, or searching for food; *range and habitat*—where a bird is found; and *voice*—songs or calls.

Although I have arranged these clues in the order I've found most helpful, the sequence is actually flexible. For instance you might sometimes consider behavior before plumage. Also, you don't usually need to use all the clues in every identification. For example, silhouette alone will identify some birds, while many species can be identified solely by their songs or calls.

Silhouette. The most important clue to a bird's identity is generally silhouette: the shape and size of the bird. Each bird family has a characteristic shape, and when you spot a bird, whether a loon, gull, sparrow, or warbler, you must know its family in order to find the appropriate pages in your field guide. Many guides include illustrations that will help you learn the silhouettes of each bird group.

Consider some examples. Pigeons and doves are long, plump birds with small heads. Swallows have slender bodies with long, pointed wings. Wrens are chunky birds with stubby tails often cocked in an upright position. Starlings have very short tails; mimic thrushes (catbird, mockingbird, thrashers) have extraordinarily long ones.

A bird's bill shape also may indicate its family. Finches, such as the house finch, American goldfinch, and common redpoll, have short conical bills suitable for cracking seeds. Warblers have needlelike bills for gleaning insects from leaves. Kingfishers' bills are strong and daggerlike for seizing fish, while kites, hawks, eagles, and falcons possess sharp, hooked beaks for ripping and tearing flesh.

A bird's size also can be important in determining its family and sometimes even species. When studying size, you need an informal scale to judge relative sizes. Try to visualize some birds you see every day. Think of small birds as being under 6 inches in length, from hummingbirds to sparrows. Medium-sized birds range from about 8 inches, such as the American robin, to about 12 inches, such as the domestic pigeon. Birds longer than 12 inches are large, such as the 17-inch common crow. Any bird larger than a crow, such as a buteo hawk or great blue heron, is considered very large.

Some field guides may confuse you with drawings that vary in scale from page to page. Small flycatchers, for example, may be pictured as large as thrushes to illustrate minute details. Consult measurements given in the text and compare them with your knowledge of the sizes of common backyard birds.

Sunset Silhouettes: To the consternation of beginning bird watchers, getting a clear look at a bird is not always easy. Nevertheless, many birds can be identified simply by their size, shape, and location. The outlines of these birds, especially the odd shapes of their bills, immediately identify them as roseate spoonbills—year-round residents along much of the Gulf Coast.

LYNN M. STONE

LIPSCHUTZ (VIREO)

JOE MC DONALD

Remember the telephone query about the plain brown bird? The description could have fit several species—cowbird, sparrow, thrush, or thrasher, to name just a few. To identify the bird, I needed to know the size and shape of the bird and its bill. So I asked a few questions.

I learned first that the bill was short and stubby, so I knew that the bird was probably a finch or sparrow. Then I learned that the bird was medium-sized, like a robin, and rather plump, with a long tail. I was pretty sure then that it was a brown towhee, a member of the sparrow family and a common denizen of California gardens. When I was told that the bird was feeding on the ground and scuffling in leaves, my suspicion was confirmed and my reputation preserved.

Plumage. Suppose you're out birding by a creek. Scattered small willows grow along the bank, and you're looking for birds hiding in the thick foliage. Suddenly an all-yellow bird pops into binocular range. Its small size and tiny, thin bill suggest a warbler. But which one?

After silhouette, the next clue to identification frequently is a bird's plumage, specifically the colors and patterns of its feathers. The key identifying parts of a bird's plumage are known as *field marks.* Some examples are spots on the breast, white in the tail corners, *wing bars* (lines on the wings), and *eye rings* (circles around the eyes).

Key field marks are often concentrated on the head, so it's best to study a bird's head first. You'll need binoculars. Check for a line through the eye, a *supercilium* (eyebrow), or an eye ring. Look for striping on the crown. See whether the *lore* (feathering between the eye and the bill) is pale and if it connects with the eye ring to form a *spectacle.*

Here are some examples of how head markings can help to identify birds. The adult golden-crowned sparrow has two black crown stripes separated by a yellow patch, whereas the similar-looking white-crowned sparrow has a bold, black-and-white striped head pattern. Or consider the Swainson's and gray-cheeked thrushes. These appear nearly identical, but the Swainson's has buffy lores and a bold, buffy eye ring; the gray-cheeked has no buffy lores and an indistinct eye ring.

Some field marks are best seen when a bird is in flight. A forked tail distinguishes a flying barn swallow from all other swallows. When a northern flicker flies away, its white rump is a showy field mark. Northern mockingbirds flash white wing patches when in flight.

Learning field marks can seem overwhelming at first. And to add to the confusion, plumages may vary depending upon the season and a bird's age and sex. Male and female birds of the same species may look entirely different, and some species molt into breeding plumages that differ from their winter plumage. Also, some birds change colors and field marks as they grow older. How do you remember all these plumages? Study your field guides, spend time watching birds, and study your guides some more. The going gets easier and easier with practice.

Now what about that all-yellow bird back at the creek? Looking closely at the brilliant plumage, you notice that the bird has faint reddish streakings on the breast and a dark eye set in an unmarked yellow head. After the bird flies away you look through the warblers in your field guide. Only one has these field marks—the adult male yellow warbler.

Behavior. Silhouette and plumage are both good clues to bird identification. Nevertheless one of the best clues to a bird's identity may be not the way it looks, but the way it acts. Many species and sometimes entire families of birds exhibit unique mannerisms or behavioral quirks as they perch, fly, or hunt for food.

Consider flycatchers. These birds spend a lot of time sitting upright on a single perch, such as a fencepost or snag. When they spot an insect, they fly out from their perch, nab their meal, then return to the perch or one close by. When you see a bird performing this behavior there's a good chance that you're watching a flycatcher. Field marks will help you determine the exact species.

Here are some more examples of diagnostic behaviors: creepers and woodpeckers spiral up tree trunks looking for insects in the bark. Vireos hunt sluggishly through the treetops for grubs, while most wood warblers tumble actively from branch to branch. Sparrows often feed on the ground, while finches cling to thistle tops in weedy fields. Sanderlings scurry up and down the open beach following the foamy edges of waves as they wash up and back. Dowitchers perform a "sewing machine" movement as they rapidly poke their bills up and down in tidal pools. Yellowlegs step quickly through shallow water, changing directions frequently, making little dashes to scare up food.

Many bird mannerisms involve special tail movements. Wrens hold their tails cocked at an angle from their bodies. The hermit thrush slowly raises and lowers its tail when pausing on the forest floor. Spotted sandpipers and wandering tattlers bob their rear ends constantly when walking. The blue-gray gnatcatcher and the sage sparrow wag their tails.

A bird's manner of flight also may help to identify it. For example, flying loons have a humpbacked look, as they hold their heads and tails lower than their rapidly beating wings. Cormorants also have a rapid wingbeat, but hold their necks and heads tilted upward and forward. Some birds of prey hunt by hovering in a stationary position, such as the American kestrel and the ferruginous and rough-legged hawks. Others, such as the northern harrier, fly low over open country, rocking from side to side.

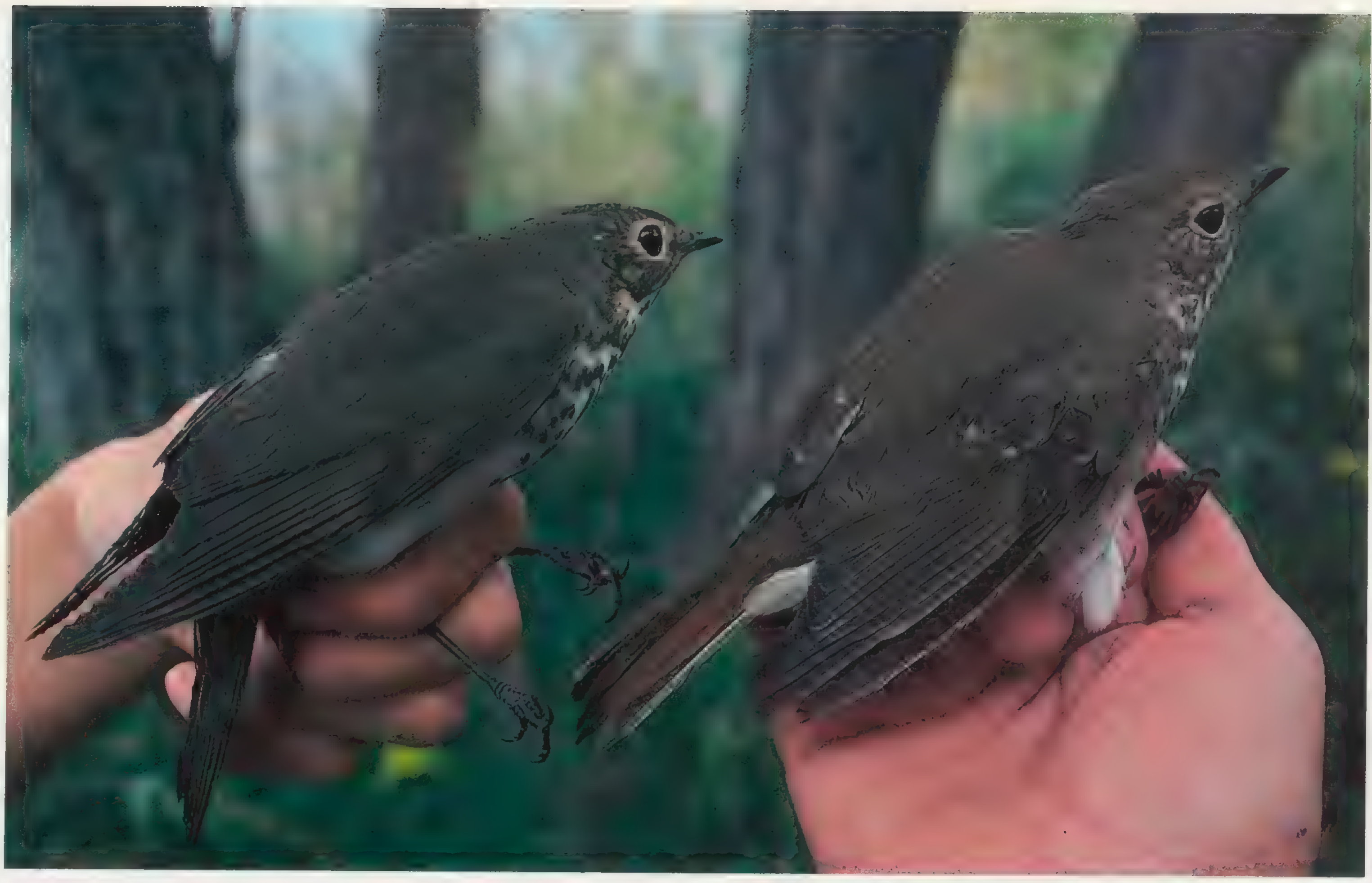
So what about the woman in my bird class who found the "woodpecker" going headfirst down the trunk of an oak tree? It wasn't a woodpecker at all. It was one of the nuthatches, all of which quickly give

WARDENE WEISSER (ARDEA PHOTOGRAPHICS)

STEPHEN J. KRASEMANN/DRK PHOTO

A bird's bill shape may indicate the family to which it belongs. Vireos, for example, have sturdy bills with hooked tips (red-eyed vireo, top left), whereas most warblers have thin, needlelike bills (yellow warbler, below). Overall size and shape may also help to identify birds. Common ravens and American crows are very similar in appearance, but the raven (on cactus) is much larger and has a long, wedge-shaped tail, while the smaller crow (on branch) has a shorter, fan-shaped tail.

Some birds are best identified by their colors and patterns, known as *field marks*. Cedar and bohemian waxwings are nearly identical save for the more colorful markings on the bohemian's wing (far right). Hermit and Swainson's thrushes also look similar, but the hermit thrush has a rufous tail and a white eye ring, whereas the Swainson's thrush has an olive tail and a bold, buffy eye ring (right). Some field marks are best seen when a bird is in flight. A flying Clark's nutcracker (below) flashes white on its wings and tail.

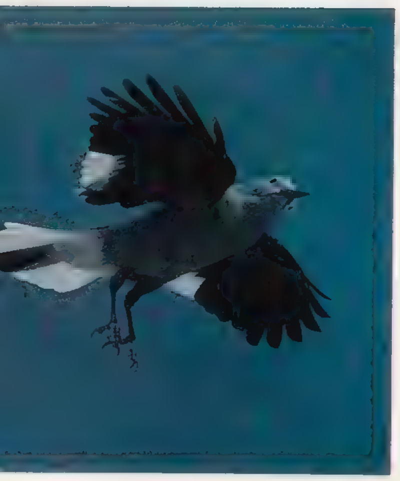


DOUG PLUMMER

themselves away with their habit of hunting upside down. Had the woman's binoculars been handy she would have seen the chunky body, short tail, and chisellike bill which make up the nuthatch silhouette, and she could have looked for field marks to determine which nuthatch it was.

Range and Habitat. Yet another clue to a bird's identity is the place that you find it. All bird species have specific geographic ranges from which they seldom stray. Consider the similar-appearing tufted and plain titmice. The tufted titmouse is found in the eastern United States as far west as Texas, while the plain titmouse is found only in the Southwest. Therefore, you don't even need to look at field marks to know that a titmouse you spy in Georgia is probably a tufted, or that one seen in Utah is most likely a plain.

It is helpful, then, to know which species are found in your area or any area in which you're watching birds. To help you, most field guides contain range maps, which show the regions in which each species is found. Even better, many areas have checklists of local birds, often available from bird clubs, nature centers, or wildlife refuges. These lists usually indicate which species breed in the area, which species migrate through in fall and spring, which are winter visitors, and which are found year round. Good checklists also indicate the general abundance of each species during each season.



J. H. ROBINSON

But just because a bird is common in your state doesn't mean you'll find it on every outing. There's another factor that influences where a bird is found—its preferred habitat. Some examples are fairly obvious: ducks are generally found near water, whereas meadowlarks are usually restricted to fields. But other examples may be less apparent. For instance, the red crossbill inhabits only coniferous woods. Therefore, knowing the habitats preferred by each species can be extremely helpful in identifying birds. Again, most field guides can assist you.

Imagine that you're in California and you've spotted two cormorants sitting on a dead log by the edge of a large freshwater lake. You can't see them very well because the sun is in your eyes. You can still determine their species, though, by using your knowledge of range and habitat.

Consider. There are six cormorant species in North America. Only three, however, are found on the West Coast—the pelagic, Brandt's, and double-crested cormorants. So you've already cut the field in half. What about habitat? Neither the pelagic nor the Brandt's are likely to wander inland. But the double-crested is found on rocky coasts and beaches as well as on inland lakes and rivers. There's your species!

Occasionally birds appear in places where they aren't supposed to be. East Coast birds sometimes show up in Arizona, California birds may appear in New York, and African species have turned up in Massachusetts. Such birds are known as *vagrants*. Therefore, you should use range and habitat clues with caution and be ever wary of surprises. As you become a more proficient birder you'll actually look forward to them.

Voice. Most species have unique songs and calls. In fact, after you've been birding for a few years, voice could well be the first and only clue you need to identify a bird correctly. Remember the woman who called one night with two birds squawking in her backyard? That was an easy identification. In general only owls make a racket after dark, and when the woman told me

that she lived in a foothill canyon and that the call sounded like a hoarse croak, I was pretty sure that she was listening to some young great horned owls begging for food.

Some people find that learning bird sounds is difficult. Listening to records and tapes is helpful, though not as helpful as getting out in the field, tracking down sounds, and watching the birds make them. Fortunately, individual species in many bird families have similar sounds—for example, the raspy, scolding notes of the wrens; the nagging cries of the jays; the delicate chips of the warblers; and the flutelike whistles of the orioles. As you begin to learn the sounds of each bird group, learning new songs becomes easier.

My own identification skills got a challenge during the 1987 Christmas Bird Count in Santa Barbara, California. This time I was the one asking the questions.

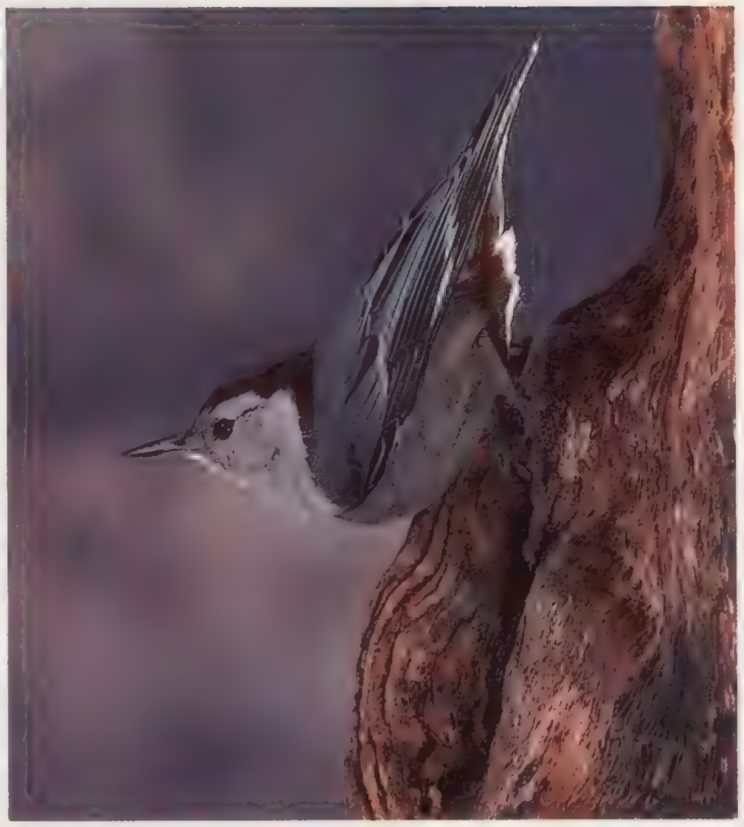
January 3, 11:00 A.M. I was walking the streets of a lush residential area, having nearly completed my Christmas Count assignment for the morning. The sun was shining and a warm breeze stirred the trees. I was growing bored watching American robins, purple finches, and cedar waxwings as they flew in and out of a dense hedge. One last time, I raised my binoculars to find out what was causing a slight jiggle in the green tangle.

A small, nondescript gray bird popped out. Wow! I had no idea what it was, and my adrenalin started pumping.

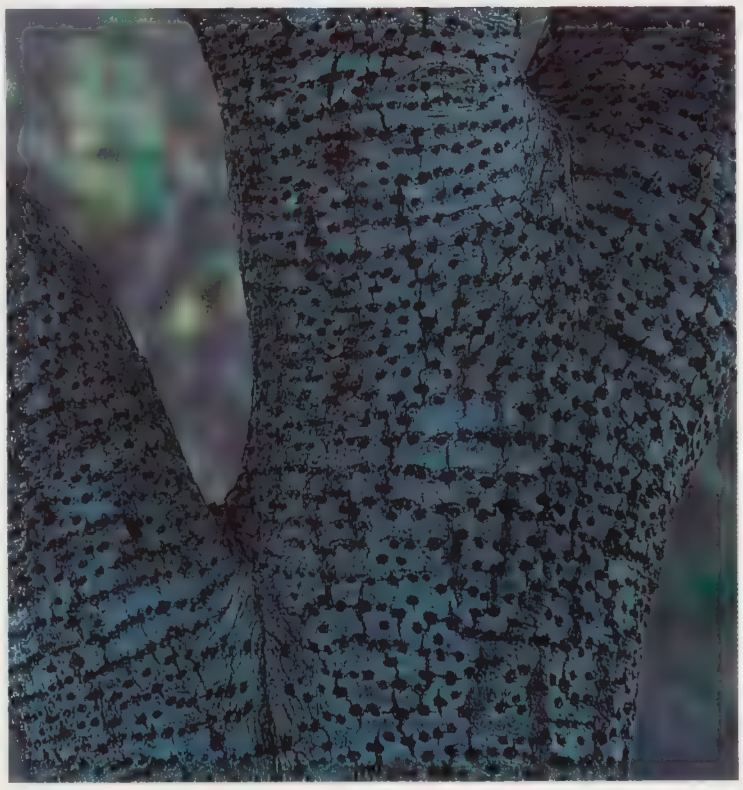
I began going through the identification steps, trying to stay calm. Silhouette—the bird had the bill and body shape of a vireo, although the tail seemed a bit long. Plumage—it was whitish-gray underneath and gray above, with a tinge of green on the back; it also had two wing bars, the second more prominent than the first, and an indistinct eye ring which faded to a pale lore between the eye and the bill. Behavior—the bird had the slow, deliberate movements of a vireo, but the tail was cocked in the manner of a wren as it hopped about, feeding in the hedge. Range and habitat—useless in this case. Whatever the bird was, I was pretty sure it didn't belong in Santa Barbara, at least not in winter, and I suspected that it was probably out of its normal habitat as well. Voice? Few birds sing in winter and this one was no exception.

I quickly sketched the bird in my field notebook. That done, I grabbed a couple of field guides. What could the bird be? I was convinced that it was a member of the vireo family because of its size and shape. The only vireos in California with two wing bars are the Hutton's, solitary, and Bell's. However, this bird had neither the clearcut spectacles of the solitary nor the eye ring of the Hutton's. And according to my field guides, the cocked tail was characteristic of the Bell's vireo.

By the end of the day, I was pestering all my expert bird friends. "I found a little nondescript, gray bird hopping in a hedge. I think it was a Bell's vireo. Ummm . . . what do you think?"



J. R. WOODWARD (VIREO)



JOHN SHAW

A bird's behavior can be a useful clue to its identity. For example, woodpeckers and nuthatches often cling to tree trunks, where they feed on insects found in bark. But woodpeckers usually move up trunks headfirst, whereas nuthatches often travel upside down. At left is a white-breasted nuthatch in a typical posture. At far left is a yellow-bellied sapsucker, a woodpecker that drills neat rows of holes (below), later returning to feed on oozing sap and the insects attracted to it.

At first they were skeptical, but when I persisted with my description and showed my field sketch, I sparked some interest—enough so that some folks went back the next day to search for the bird. Luckily, they found and confirmed it as a least Bell's vireo—the West Coast subspecies of the Bell's vireo—an unusual winter record. The bird should have been long gone to Central America. I had never seen the species before, but I'd learned the identification clues and put them to work.

You can, too, and I hope you will. Just do me one favor. Find somebody else to call in the middle of the night! □

Joan Lentz enjoys teaching and writing about birds in Santa Barbara, California. This article is adapted from her book, coauthored with Judith Young: *Birdwatching, a Guide for Beginners* (Capra Press, Box 2068, Santa Barbara, California, $6.95). Printed by permission.

WAYNE LANKINEN

©87

Quick, Three Beers!

JACK CONNOR

I first realized there was more to bird watching than watching birds on a spring field trip led by Frank Mead of the University of Florida.

I was standing in a circle of fellow novices, awaiting Dr. Mead's arrival at our lakeside rendezvous spot, when the trees overhead suddenly filled with birds.

"What are they?" someone asked.

"Chickadees," somebody answered. "Or maybe sparrows."

They looked like flying blots to me. It was one of those Florida mornings when the haze is so bright that it hurts your eyes to raise your head above the horizontal. Fumbling with my new binoculars, I managed to follow one blot as it worked its way to the end of a cypress limb, threw back its head, and sang: *buzzy-buzzy-zip!*

"What's that one—a goldfinch?"

"It's tiny. Is it a kinglet?"

Just then Dr. Mead pulled up alongside us, his window rolled down. "Good morning," he said. "What've you got?"

I shrugged. "Can't tell. It's at the top of the tree and right in the sun."

Buzzy-buzzy-zip!

"Parula warbler," Dr. Mead announced, without looking up. He parked his car, opened his door, and began lacing his boots while reeling off identifications. "There's a prairie . . . there's a pine . . . a great crested . . . cardinal . . . prothonotary warbler . . . yellow-billed cuckoo . . . summer tanager."

What an amazing trick, I remember thinking. *He hasn't even glanced at one bird yet!*

Perhaps only a beginner as green as I was can appreciate how lucky we are that birds sing. Experienced birders tend to take for granted two facts: first, that the most visible animals on our planet are also the most vocal; and second, that the majority of them have voices we can distinguish and identify. It didn't have to turn out that way. Under a different set of evolutionary pressures, birds might have developed smell or some other sense as their means of individual recognition.

Instead we live in a world where the sounds of birds are as inevitable as the rising of the sun, and the first problem faced by novice ear birders is acoustic overload.

On a typical spring morning in a typical patch of northeastern woods, for example, you hear three or four times as many birds as you see. Of those you do see, probably half are birds you would have missed if you hadn't heard them first. In all but wide-open habitats, ears are far more effective instruments for detecting birds than eyes, because ears don't need clear lines of hearing.

Birding by ear is not easy, however. One problem is sensory. As we age, our ears lose their ability to distinguish high pitches. Many adults have trouble distinguishing among pitches above 4,000 hertz (cycles per second), approximately the pitch of the top note of a piano and the call of the killdeer. Yet the killdeer's call is 1,000 hz lower than the average frequency for the songs of North American wood warblers, 5,400 hz. And many passerines hit notes above 7,000 hz; the eastern kingbird and brown-headed cowbird peak out at more than 10,000 hz.

Another problem is conceptual. Humans are visually oriented creatures and most birders find it easier to remember a bird's shape and colors than its calls and songs. Only people who have had musical training seem able to memorize bird songs as pure sound. Most of us must convert them into something else.

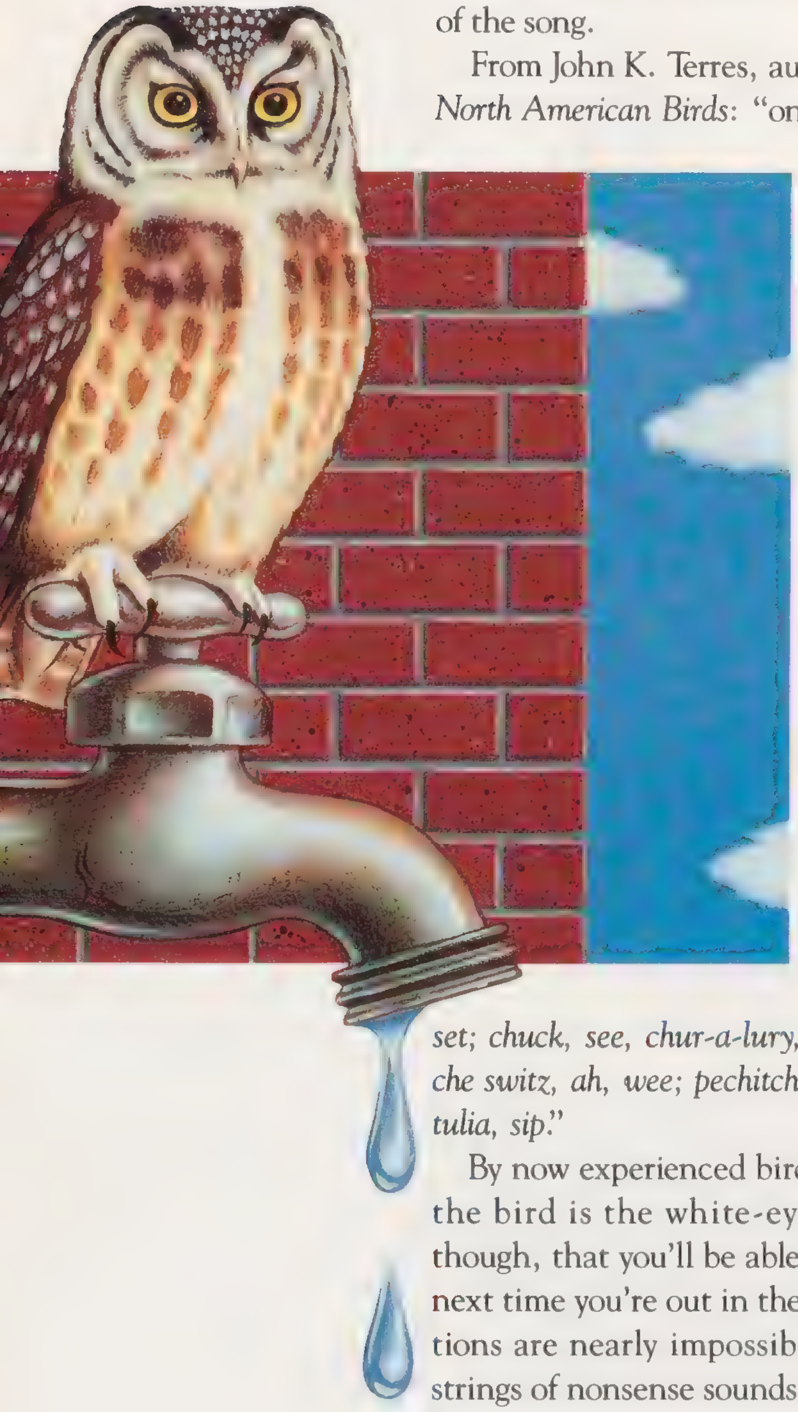
Most field guide descriptions of bird song combine a verbal sketch of the song's general characteristics with a phonetic interpretation. These descriptions are best

ILLUSTRATIONS BY STEVE CARVER

used to confirm a bird you've identified by sight. They are not intended to be used to identify unseen birds. Here is one such description from *The Audubon Illustrated Handbook of American Birds* by Edgar M. Reilly. Can you identify the species?

"The call is a simple *click*; the song is variable, but consists of many short, quick notes interspersed with long, clear, down-slurred whistles, as *wheeeoo*. Each individual may have 2–3 different songs."

One problem with phonetic interpretations is that birds are under no obligation to articulate consonants. Also, phonetics are conceived in the ear of the listener, so interpretations vary from one source to another. Here, for example, are two more interpretations of the song.



From John K. Terres, author of *The Encyclopedia of North American Birds*: "one [call] is a sharp *chick! ticha wheeyo chick!*, another, *chick-ah-per-weeoo-chick*, in [the] South *quick, take me to the railroad, quick!*, in Bermuda *gingerbeer-quick!*, in Illinois, *chick'ty-beaver-lim'ber, stick*. . ."

From Witmer Stone, author of *Bird Studies at Old Cape May*: "The simplest songs run: *tick, che-weeo, sick; chuck, che-wee-ju; ill, chee-wheo, chip; see it, see, wee-ah*; and a shorter: *chick, wissa*. Other more complicated phrases are: *chick, che-weary-o-wisset; chuck, see, chur-a-lury, stick; che-wirra, chu, wee, che switz, ah, wee; pechitcha wirra, wee; swee-a, sipititulia, sip*."

By now experienced birders may have guessed that the bird is the white-eyed vireo. It is doubtful, though, that you'll be able to use these phonetics the next time you're out in the field. Phonetic interpretations are nearly impossible to remember. They are strings of nonsense sounds, so they fly from the mind like swallows leaving a barn.

How do you learn and remember bird songs? Writing down your own phonetic interpretations is a good first step, because the note taking will encourage you to listen closely. But if you want practical and reliable identification clues, you must convert your notes into something shorter and more memorable: *mnemonics*.

The simplest verbal mnemonics are acoustic analogies. The red-breasted nuthatch's call sounds as if it comes from a toy horn. The rusty blackbird's is like a squeaky hinge on an old fence. The kingfisher's flight call is like a baby's rattle. The Virginia rail oinks like a pig. The call of the ring-necked pheasant sounds like someone reeling in laundry on a rusty clothesline. The call of the boreal owl drips like water.

A more sophisticated form of mnemonics works by species association. Roger Tory Peterson has observed that the song of the rose-breasted grosbeak is like the robin's but seems to be sung with more feeling, "as if a robin has taken voice lessons," and an evening grosbeak's call is like a "glorified house sparrow's." Arthur Allen taught his Cornell students that the scarlet tanager sings like "a robin in a hurry with a cold."

Another common mnemonic is the English "translation." Best known of these may be the rufous-sided towhee's "Drink your tea," or the ovenbird's "Teacher, teacher, teacher!"

"Pretty, pretty Rachel," sings the magnolia warbler. Its longer song sounds like, "She knew she was right; yes, she knew she was right."

"Sweet, sweet, sweeter than sweet," the yellow warbler carols.

"Pizza!" shouts the acadian flycatcher. "Quick, three beers," whistles the olive-sided flycatcher.

When you memorize a mnemonic, try to incorporate a mental image which will connect you back to the species. "Drink your tea" is a successful mnemonic only if it generates a picture of the towhee. To memorize the cue, picture a towhee wearing teabags around his neck or sitting on the edge of a teacup. Or you might think of the call as "Drink-tow-hee" and imagine lifting the teacup to your mouth with the bird inside.

Absurd and ridiculous images are the most memorable. Picture a kingfisher flying with a baby's rattle stuck in its mouth. Think of the yellow warbler as a piece of candy—bright yellow with cherry stripes. "Sweet, sweet, sweeter than sweet!"

Drab and colorless birds are the hardest to incorporate into mnemonics. The veery, for example, has a beautiful and distinctive song, which seems to whirl down into a well, echoing off the sides. The bird itself, though, is plain and hard to picture. Here the trick is to play on the bird's name: "The veery sings a *veering* song."

Someone taught me to memorize the fish crow's call as sounding like it came from a crow with a clothespin clipped to its nose. But the fish crow is visually identical to the American crow, and out in the field, hearing that nasal *caw!* I kept forgetting which crow was supposed to wear the clothespin. I had to modify the mental image to that of a crow with a *fish* pinned to its nose.

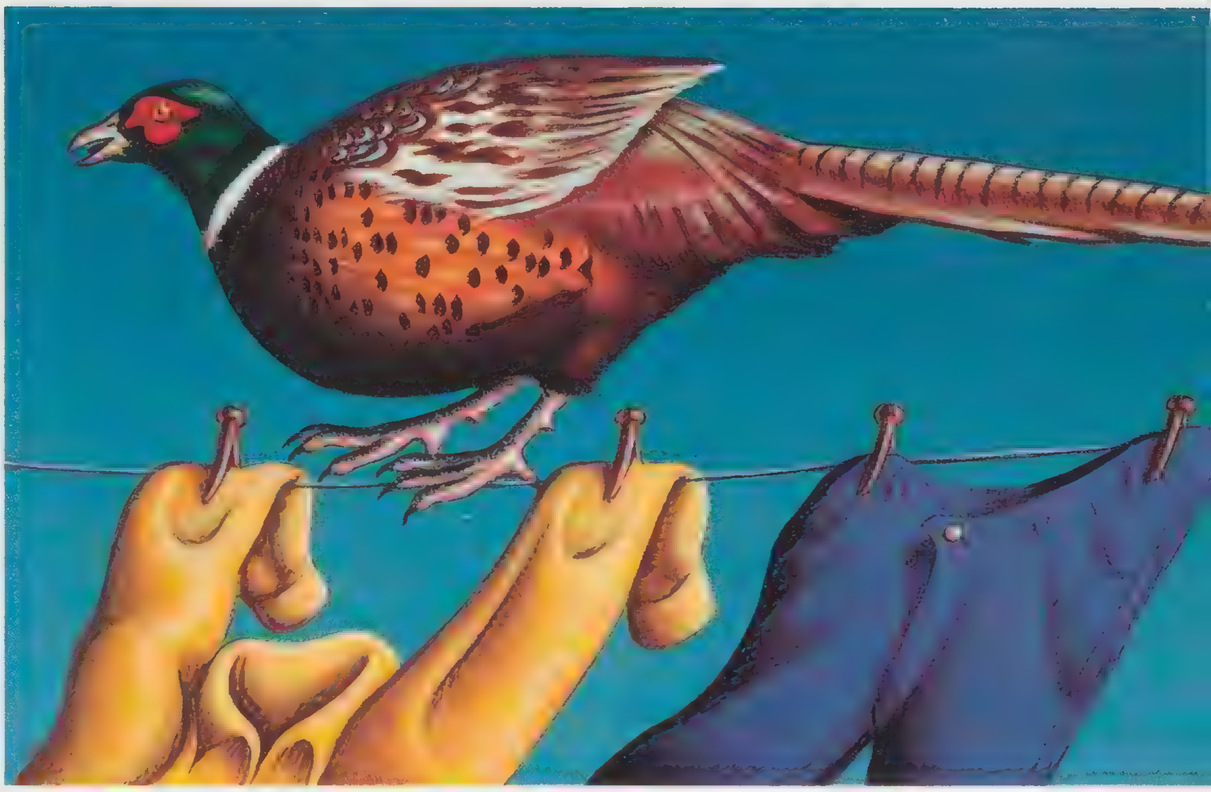
Inventing your own mnemonics is much better than memorizing someone else's. Then the linking images will spring from your subconscious, polished and sharpened by your own personal references. My mnemonics for the white-eyed vireo are "Check! Pierre, check!" and "Check! Hey you, Pierre, check!" and I picture a little man at a Parisian outdoor cafe—James Joyce, perhaps—wearing thick, wire-rimmed glasses (white eyes) and trying to get some service. "Pizza!" links in my mind to the acadian flycatcher because I don't like green peppers on pizza and the acadian is greenest of the *Empidonax* flycatchers. It's not logical, but it works.

Once you've learned the key species for your area and built up your repertoire of references, you can move on to more elegant and powerful mnemonics. Randy Little, who grew up in Ithaca, New York, and has been contributing recorded bird sounds to the Cornell Laboratory of Ornithology for more than 20 years, recalls how Arthur Allen taught his students to distinguish two of the most difficult warbler songs. "Doc Allen taught us to remember Tennessee warbler by thinking of a tennis ball bouncing. 'Tennis' suggests 'Tennessee' and when you bounce a tennis ball it first bounces several times distinctly, then accelerates toward the end as the bounces shorten and finally blur together: *see......see.....see....see...see..see.see-see-see.*

"The way he taught us to remember the Nashville warbler's song was to remember the association of Nashville and Tennesee, and notice that the Nashville's song is like the Tennesee's—the same beginning, with spaced notes then acceleration, but it doesn't have the third part, the blurring together. *Nashville is only a part of Tennessee.*"

It would be nice to end with a claim that hearing is believing, that acoustics is the key to omnipotence, and that birders who learn to use their ears will live happily ever after.

Unfortunately, it just ain't so. Starlings can call like killdeers, blue jays can scream like red-shouldered hawks, catbirds can sound like thrashers, thrashers can sound like mockingbirds, and mockingbirds can sound like a tree full of birds in a nightmare. Birders who depend too much on their ears are just as susceptible to error as birders who depend too much on their eyes. What is true is that following your ears will lead you to discoveries you never would have made by eye alone.



My brother Greg was walking with a female companion along a forest trail in Illinois one afternoon when he heard a familiar sound: *kah-erk!*

"Hear that?" he said. "Ring-necked pheasant."

His friend gave him a warm look of admiration. "You know bird calls?"

"I know that one. It's supposed to sound like someone reeling in laundry on an old rusty clothesline."

Kah-erk!

"Let's cut through the woods," said Greg. "You've got to see this bird. It's huge and beautiful."

Greg led the way into thick and tangled brush. There was no path. Ten steps into the woods, they were forced to walk backward to keep the briers out of their faces. Fifty steps in, they were creeping on their hands and knees.

Kah-erk! Kah-erk!

The brush parted at last to reveal a cyclone fence. There was no going back, though, and Greg persisted. He led the way along the fence, following the call of the bird, until they found a break, squeezed through, and staggered out to the road beyond.

By this point the friend's look had gained a little heat. "Where the hell are we?"

Kah-erk! Kah-erk! The sound was almost on top of them.

Greg hurried across the road, looked down a knoll, and found his "pheasant"—a woman in curlers, reeling in her laundry from an old rusty clothesline. □

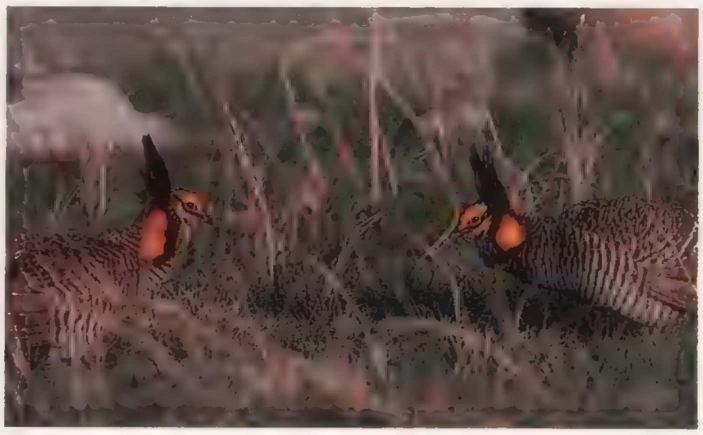
Jack Connor teaches writing at Stockton State College in New Jersey. This article is excerpted from his book, *Good Birding*, to be published in 1988 by Houghton Mifflin Company, Boston.

Prairie Boomers

TEXT AND PHOTOGRAPHS BY GARY R. ZAHM

APRIL dawn in South Dakota: a hint of light appears along the horizon. Western meadowlarks have already begun their undulating songs from selected territories on the prairie. From a wooded draw, the raspy crowing of a male ring-necked pheasant drifts upward on the breeze. Twinkling farmhouse lights signal an awakening family.

Suddenly the sound of approaching wingbeats announces the appearance of a male greater prairie-chicken. In rapid succession, more males are heard arriving on the hilltop. As they align themselves on their predetermined territories, the prairie reverberates with a cacaphony of hoots and cackles. The spectacle of a booming ground has begun.



The first rays of sunlight illuminate the grassland and the booming ground's drama becomes apparent. Scattered along the rock-studded hilltop are the actors, arrayed in various postures of the annual courtship dance.

Overlooking the booming ground from a large rock, the dominant prairie-chicken rooster searches for an approaching hen. Suddenly his neck stretches parallel to the ground and his erected neck tufts point forward. His spread tail rises vertically and his wings extend downward, almost touching the ground. With a pirouette, the rooster stamps his feet vigorously, producing a drumlike rumbling on the rock's surface.

As he stomps his feet he inflates the brilliant orange air sacs on the sides of his neck. Actually two lateral portions of a central sac, these act as amplification chambers for the booming sound produced by the prairie-chicken's syrinx, or vocal mechanism.

Jerking his head downward, the male begins the haunting call, *whoo-hoo-hoo*, a ventriloquial sound audible a mile away. Then the air sacs deflate and the bird springs into the air, cackling loudly—only to land five feet away in the dew-covered grass, where he struts along grandly, then repeats his nuptial display.

The approach of another rooster arouses the dominant male's territorial defense behavior. With neck outstretched, wings drooped, and neck tufts and tail erect, he approaches the challenger. Facing off across an invisible boundary, the two birds seem to glare at each other.

After some feints and false starts, the dominant male suddenly hops into the air and intimidates his opponent with rapidly beating wings. The quasi battle over, both birds retreat to the neutral areas of their respective territories.

Jumping onto a large rock, the dominant male again searches for hens. Neck outstretched, he emits an extended cackle: *ca-ca-ca-caa-caa*. Then he leaves the rock to repeat the booming ritual. When finished with his performance, he pauses to feed on some emerging grass shoots.

Now a prairie-chicken hen enters the booming ground. She moves toward the dominant male, passing the subordinate males, who continue to display. Finally reaching the rooster's territory, the hen waits impassively as he struts and displays with increased fervor.

His dance ended, the rooster advances to the hen and mounts her from the rear. After a brief copulation the hen moves off to a secluded section of grassland where she hollows out a nest and soon lays a clutch of a dozen, olive-brown eggs.

The booming ground will resound with displaying roosters for days after the last hen has visited. By the end of May, however, even the most persistent male will have left the area to spend the summer in clumps of buffalo-berry, buckbrush, and wild rose sprinkled among the Missouri River breaks. □

Gary Zahm is a freelance photojournalist who specializes in portraying wildlife action in natural habitats.

Canada Geese

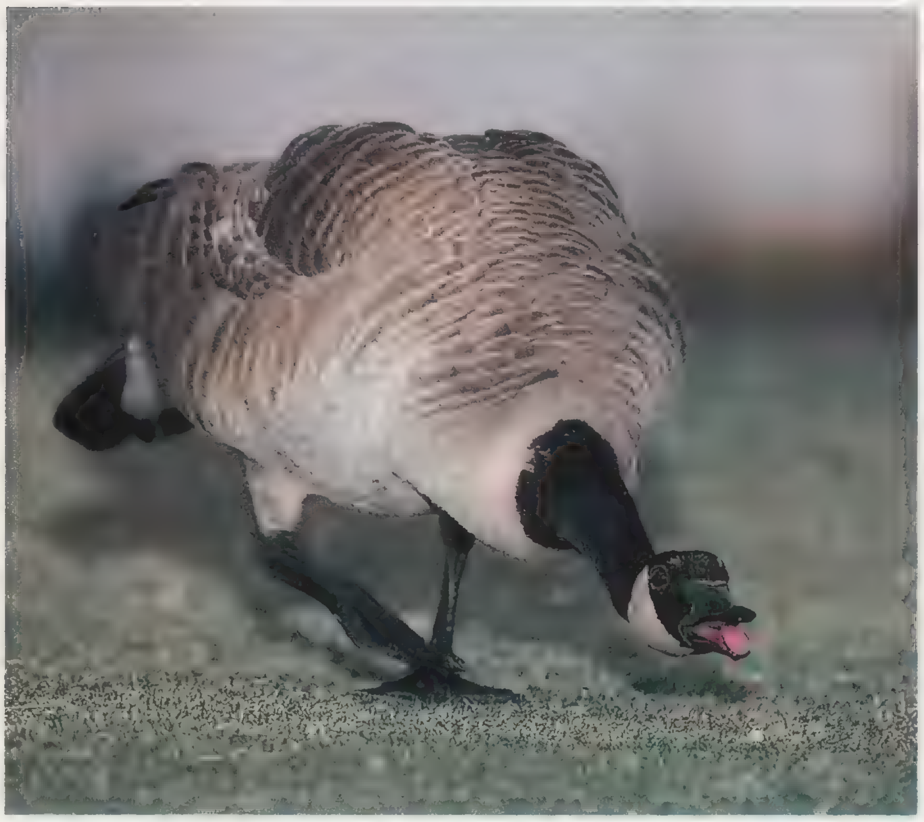
One winter morning at the Great Meadows National Wildlife Refuge in Concord, Massachussetts, a faint but continuous sound drew our attention to the sky. We could just discern a line of birds against the horizon, stretched out like a black thread undulating in slow motion. The sound grew louder as the birds approached, and soon we could see hundreds of Canada geese flying toward us in constantly shifting formations. The sky became filled with geese and the loud clamor of their honking as squadrons of birds passed overhead, then circled to descend to the partially frozen water below.

We watched the geese break speed by spreading their wings and tails, and saw them tip from side to side to coordinate their landings. With feet braced like airplane landing gear they glided across the water's surface creating a frothy wake. After they landed, the birds broke up into small groups. Why did they form groups, and what kept them together?

Most likely the groups were families, consisting of an adult pair and its young from the previous summer. Research on banded Canada geese has shown that goose families generally stay together during fall and winter. Individual geese probably recognize family members through subtle differences in their calls, and geese can maintain family groups even within huge flocks.

Although it may seem natural that goose families stay together throughout winter, such behavior is rare among birds. Even close relatives of geese such as ducks do not share this habit. In fact, most male ducks never even see their young, for they leave their mates before the young hatch.

Canada geese have many displays that express dominance. The *head-forward display* (below) signals that a bird may soon attack; right, a male goose acts on a threat, causing an intruder to flee hastily.



MARY CLAY

Why should geese have evolved long-lasting family ties? How are such ties beneficial? Some answers come from studies of interactions that occur among geese in winter flocks. Two observations are significant. First, wandering juveniles separated from their families are often pecked at and chased by other flock members. Second, large families of geese are dominant over smaller ones and thus obtain better feeding and loafing spots during winter. Adult males generally defend these spots, deriving authority by maintaining large family groups. Thus, a male goose with five family members dominates another male with only four. But if two members wander away, then the male with four family members gains the upper hand.

Larger families of geese are dominant over small ones and thus obtain better feeding and loafing spots during winter.

So remaining in family groups has two advantages for geese. Parents shield young birds from the aggression of flock-mates, while the entire family finds power in numbers, enabling it to obtain prime feeding sites and safe roosting positions. These could be particularly advantageous to Canada geese because they are very large birds; they need lots of food to sustain themselves, and being slow moving, are vulnerable to predation.

Another possible advantage of long-term family ties may be social learning. During migration, Canada geese travel in large flocks and stop at traditional feeding areas. Perhaps young geese learn the location of these areas by following adults. If food is scarce in one place, the young can follow adults to alternative feeding spots discovered in the past.

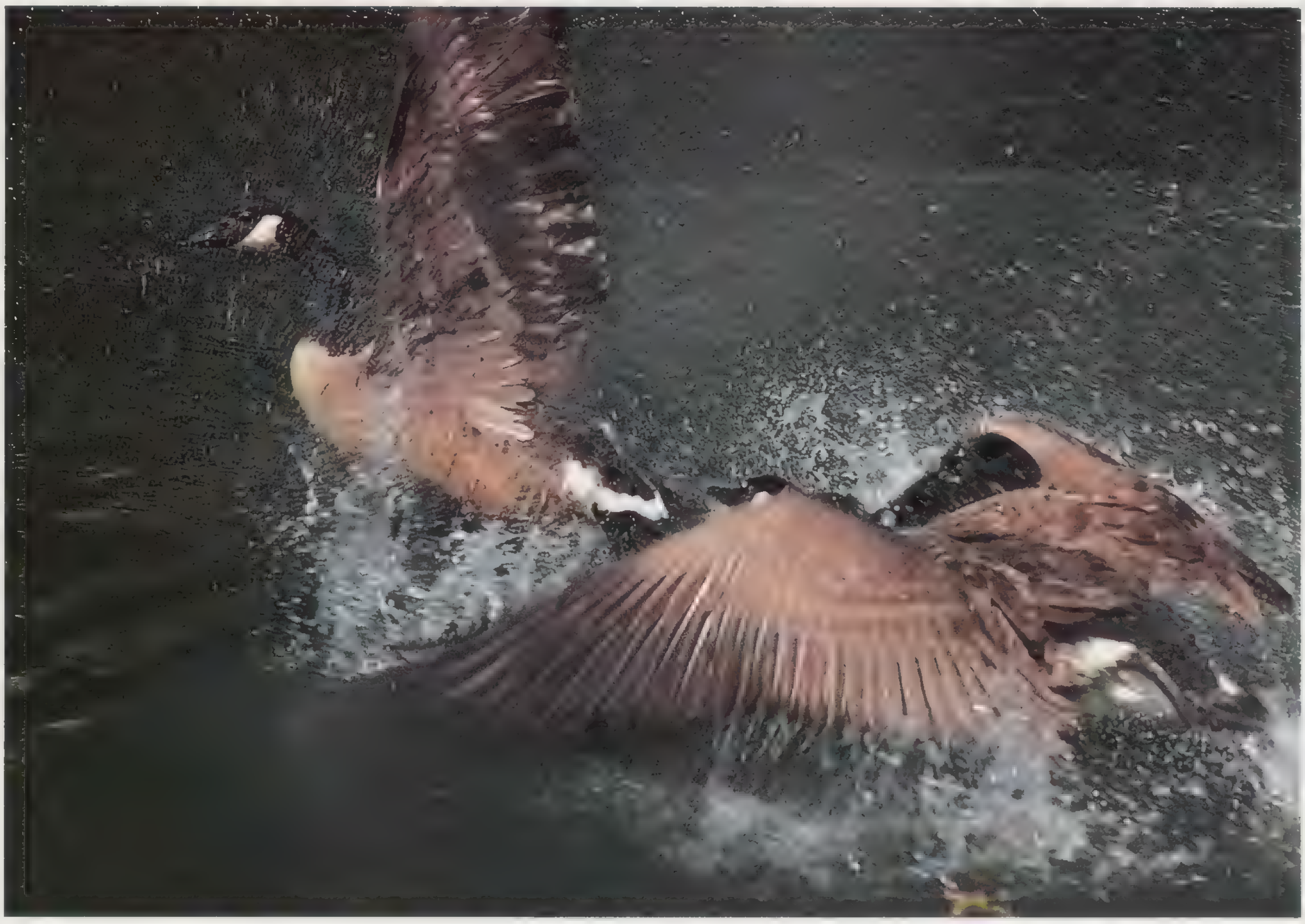
Another unusual feature of Canada goose social behavior is the year-round, close association between paired adults. Males and females both participate in raising young and remain together even in successive years—unless one bird dies, in which case the other usually finds a new mate before the next breeding season. Why do Canada geese have such strong pair bonding?

One reason may again be the Canada goose's large size. Because the female is conspicuous on the nest, she and her eggs are vulnerable to predators. The male, however, by remaining nearby, protects and guards her from danger. Also, the female needs a lot of food to obtain sufficient nutrients to lay her large eggs. The male goose aggressively defends an area around the nest from the start of breeding to the time the eggs hatch; this behavior probably protects a valuable feeding location as well as the nest and mate. And by remaining together after the eggs hatch, the adults can protect their goslings throughout their relatively long period of maturation.

In any flock of geese you can see many examples of the social system at work. Two geese moving about, feeding and resting together, are probably a paired male and female. Although their plumage is nearly identical, there are several ways to distinguish the sexes. The male is slightly larger than the female, and he generally takes the lead in aggressive encounters with other geese. Also, the male's voice is a low *a-honk* while the female emits a higher *hink.* As a pair of geese flies overhead the birds' voices often alternate.

The next time you see a flock of geese, look for family groups. A small group of three to eight birds is probably a family composed of two parents and their young from the previous breeding season. Also watch for interactions between families, which are common and easily seen.

When two families come together the male of the dominant group generally exhibits several visual displays that express his dominance. In the *bent-neck display,* he coils his neck back, lowers his head, and points it toward the opponent. This is a mild threat. In the *head-pumping display,* he lowers his head and raises it in a pumping motion. This signals that he may soon attack. He may also do the *head-forward display,* by extending his neck, holding it low, and pointing it at the opponent, honking all the while. These actions all serve to make a less dominant group move or halt an approach.



PHYLLIS GREENBERG (2)

Canada geese are favorite birds for many people, perhaps because their loud calls and striking formations draw our attention away from our busy activities, reminding us of the changing seasons. Furthermore, they are creatures that have evolved a social system unusual in the world of birds—long-term family ties and year-round pair bonds—that helps them survive and compete in a challenging world.

—Donald & Lillian Stokes

THE ACID TEST

TEXT BY ROB ALVO
PHOTOGRAPHS BY PETER M. ROBERTS

PETER Peloquin is a monument, a reminder of days gone by. He's a trapper and owns a hunting and fishing camp at Chiniguchi Lake, about 200 miles north of Toronto, Ontario. He's been there a long time.

Back in 1928, before loggers developed the road that now meanders through the area, Mr. Peloquin first worked his way along lakes and rivers that twisted through wild country and led to the north end of Chiniguchi Lake. There he set up his trapline. In 1947 he started building log cabins and entertaining fishermen guests. In the early days their daily catch was guaranteed.

In the 1950s, though, Mr. Peloquin began noticing that many fish were dying in Chiniguchi Lake. While paddling his canoe he would often see something making conspicuous ripples near the surface. Invariably it turned out to be a large trout or bass floating helplessly, barely alive.

Acid rain has caused some Canadian lakes to become devoid of fish, the common loon's primary prey. Adult loons nesting on these lakes can sometimes find food by flying to lakes nearby, but their flightless chicks often starve.

Mr. Peloquin suspected the cause of death almost immediately—dense clouds of smoke that had moved through the area for decades, originating from copper and nickel smelting operations near the city of Sudbury, 34 miles away. His livelihood threatened, Peloquin presented some dead fish to local government officials, requesting that they test the fish for chemicals. But he never got a response and concluded that "they probably took them home and ate them."

Had the fish in fact been tested, chemicals may not have been found. Nevertheless the trapper was correct to blame smoke clouds for the fish deaths. What was happening at the Sudbury smelters was a problem happening throughout much of the world: air pollutants from smokestacks were forming acids and returning to Earth in rain, entering rivers and lakes, and killing aquatic organisms (see page 28).

Chiniguchi and its neighboring lakes have been exposed for decades not only to short-range transport of acids from the Sudbury smelters, but also to long-range transport of acids originating in the midwestern United States. In addition many lakes in the Sudbury area contain only small amounts of acid-buffering limestone, so these lakes are among the most acidic in North America. Today Peter Peloquin's log cabins still stand by Chiniguchi's shores, but the acid water has killed all the fish except a few lingering suckers.

I first met Peloquin when my car broke down near his camp and I went to him for help. I had come to the area to run the Ontario Lakes Loon Survey, a project of the Long Point Bird Observatory, and quickly discovered Peloquin to be a wealth of information. I asked him about Chiniguchi.

"The water is extremely clear," he told me. "It looks dead, like there's nothing in it. We used to hear many bullfrogs—now we hardly hear any. The muskrats are much thinner than they used to be because there aren't as many water plants for them to eat." Then he showed me some large red pines that he had cut. "We had to cut these down because they're dying and rotting inside. The last rings are so close together that you can't tell them apart. There's been almost no growth for those years."

And loons? "I see lots of loons, but no young ones. Adult loons are scavengers and should be able to survive on just about any lake. But they can't find anything to feed their chicks on Chiniguchi."

I wasn't surprised to hear that. I hadn't seen many

GREGORY K. SCOTT

Adult loons must feed their young until the chicks are old enough to forage for themselves. The young require great quantities of food—fish, crayfish, leeches, plant material, even aquatic insects such as whirligig beetles (below). All of these prey decrease as lakes become acidic. Because young loons are entirely dependent upon food found in their natal lakes, many die before they can fly to more hospitable waters.

young loons either, and the Ontario Lakes Loon Survey already had suggested that common loons may have low reproductive success on acidic lakes. I hoped to confirm or refute that suspicion while running the project during 1982 and 1983.

Common loons are fascinating birds that have captured the affection of countless hikers, canoeists, and cottage owners in Canada and the northern United States. Although loons spend the winter in marine coastal areas, they breed on northern freshwater lakes, where their haunting calls fill the air with a sense of wilderness. Their food consists mostly of fish, although they also eat invertebrates, frogs, and some vegetation. Loons usually nest on small islands where they can avoid raccoons and skunks, which prey on their nests. The birds' legs are located far back on their bodies, giving them great underwater mobility, but making them clumsy on land—so they nest right next to shore.

During the roughly 28-day incubation period, both parents take turns sitting on their two eggs. The downy chicks venture into the water within a day of hatching and never return to the nest. They are vulnerable to cold, fatigue, and predation for about two weeks. Unlike ducklings, young loons cannot travel overland to feed in other lakes and ponds. Therefore they are dependent upon food found in their natal lake for at least 11 weeks after birth, when they learn to fly. This long period of confinement makes it relatively easy to assess loon breeding success.

During the summer of 1982 I surveyed 84 randomly chosen lakes. I found loons nesting on only 30, to which I returned in 1983 and 1984. In the early part of each summer my assistant and I drove from lake to lake, spending between one and four hours on each one. First we paddled quietly along the shoreline, searching for loon nests. Then we collected a water sample to analyze for acidity (pH) and acid neutralizing capacity. After long days of surveying we always dreaded the analyses, which often were completed in our tent by the light of a gas lamp. But the samples had to be analyzed quickly to ensure accuracy. While some of the lakes were still healthy, many were so acidic that aquatic organisms must have been suffering.

Later in the summer we revisited each lake to search for young loons. We found young on some lakes, but on others there were no young in sight—even at some lakes where we knew that the eggs had hatched, because egg-membrane sacs remained on the nests. Although we never found any carcasses, we were certain that the chicks had died. If they had been alive, we surely would have seen them. They must have hatched and died between our visits.

Not surprising, we found that breeding success varied depending on acidity. Over the three-year period, 62 percent of the broods on the most acidic lakes disappeared. On healthy lakes only 14 percent of the broods disappeared, while on lakes of intermediate acidity, 20 percent were gone. Clearly, reproduction was much reduced on acidic lakes.

The most probable cause of death seemed to be food shortage. Young loons require a great deal of food—plant material, crayfish, aquatic insects, leeches, and

MARTY CORDANO

The High Price of Dirty Air

Acid rain may be the most dangerous form of pollution that our environment has ever faced. It kills vegetation and aquatic organisms. It affects the reproduction of certain animals that live on land. It causes respiratory ailments in humans and corrodes buildings and statues. It travels thousands of miles from its source, ignoring political boundaries. And its effects on the environment are extremely long-lasting.

Although acid rain didn't make front-page news until the late 1970s, it has been with us for a long time. The term was coined by a British chemist in 1872 who noticed that rain falling on industrial England was corroding buildings. In recent years, however, the effects of acid rain have become increasingly acute and widely recognized. Thousands of lakes have become lifeless in Sweden, Canada, and the eastern United States. More than one-half of the trees in Germany are dead or dying. The Taj Mahal, the Acropolis, and the U.S. Capitol are dissolving. The problem? Increased air pollution, especially from automobile exhaust pipes, ore smelting operations, and coal- and oil-burning power plants.

Thousands of lakes have become lifeless. More than one-half of the trees in Germany are dead or dying. The Taj Mahal, the Acropolis, and the U.S. Capitol are dissolving.

When fossil fuels are burned, the oxides of nitrogen and sulfur are released into the atmosphere. These acid precursors then rise to high altitudes, especially when emitted from tall smokestacks. Over a period of days or weeks the oxides react with moisture and sunlight to form sulfuric and nitric acids which can travel for thousands of miles, eventually returning to Earth in rain, snow, and dust.

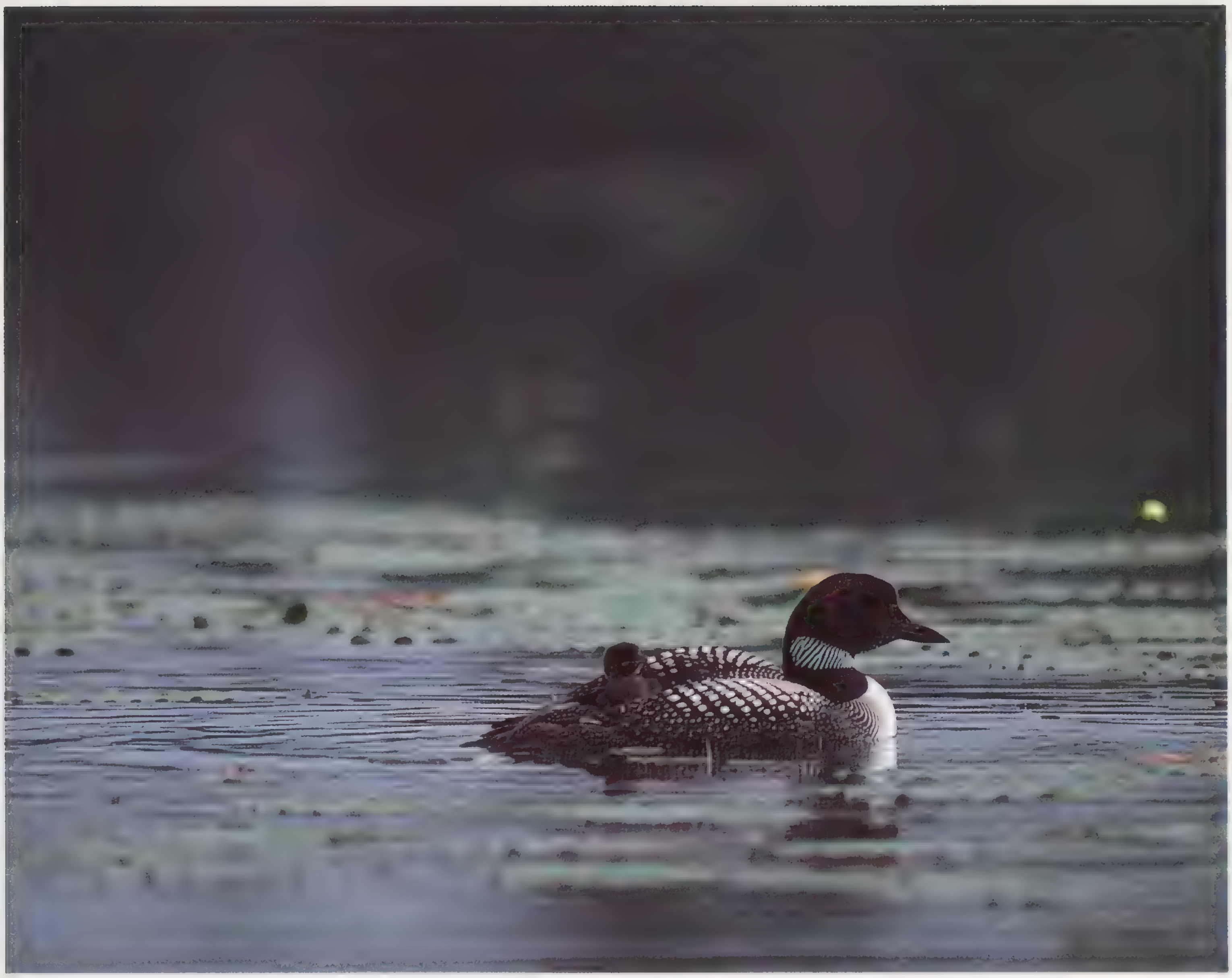
Acid rain has its greatest effects on streams, lakes, and ponds, where it kills organisms at all levels of food chains, from tiny photosynthesizing algae to predatory fish. The greatest damage occurs in the spring, when meltwater from acid snow gushes down streams, emptying into ponds and lakes which contain the vulnerable eggs and larvae of fish, amphibians, and aquatic invertebrates. The amount of acidity to which these organisms are subjected depends on the acidity of the meltwater, the location of organisms in the lake, and the amount of contact that the water has with dissolved limestone, an acid neutralizer. Thus the seasonal damage varies from lake to lake. Nevertheless, continued acidification will kill nearly any lake over a period of time.

Acid rain also seems to kill forests. This subject has been highly controversial, because pinpointing the exact cause of a woodland's death can be very difficult. But recent studies have shown that in some areas, particularly at high elevations, forests frequently come into contact with clouds that are laced with acids and other toxic chemicals. Leaves and needles are damaged when they absorb the poisons during gas exchange, and acids also mobilize soil-bound aluminum, a toxic substance which can be taken in by tree roots. In Europe, acid rain is now blamed for the death of 16 million acres of trees in nine countries.

Acid rain even affects birds. Besides depressing the reproductive rate of loons, which live in water, acids also may harm reproduction of birds nesting near water. In Wales, dippers breed in low numbers along acidic streams because of the shortage of invertebrate food. In Sweden, some flycatchers nesting near acidic lakes have produced very few young, while adults have been found dead on their nests. The culprit seems to be high levels of aluminum, which is leached from soil by acidic water and accumulated by insects on which flycatchers feed. Aluminum may kill birds directly or interfere with their ability to form healthy eggshells.

Other birds that obtain food from fresh water may also be affected by acid rain. Concerns are being raised for ospreys, bald eagles, and ducks. And birds that live in forests killed by acid rain will also be affected. In Quebec, studies to examine the effects of maple die-off on birds are being conducted by the Canadian Wildlife Service.

There's only one solution to the acid rain problem. Countries the world over must reduce the amounts of sulfur and nitrogen oxides released into the atmosphere. Reductions can be made in several ways: installing scrubbers in smokestacks, switching to low-sulfur fuels, using more solar and wind power. The technology to reduce acid rain without changing our standard of living already exists. For example, Japan cut emissions of sulfur dioxide by 73 percent between 1968 and 1978 by installing smokestack scrubbers and tightening limits on automobile exhaust emissions. Other countries, including the United States, would do well to follow Japan's lead. As long as the U.S. stalls, other countries may feel justified in doing the same. Meanwhile the cost—measured in dead fish and trees, damaged crops and buildings, and lost tourism—is running to billions of dollars. —*R. A.*



Loon chicks often ride on their parents' backs. When healthy, the chicks ride in an upright posture (left). But starving chicks may lie down on the rear of their parental surfboards, their feet dangling in the water.

fish, all secured by the parents, mostly from shallow, nearshore waters. All these prey decrease as lakes become acidic. Adult loons on acidic lakes might be able to feed themselves by flying to healthy lakes nearby, but feeding their chicks in this way would require too many energy-draining trips.

I thought I might be able to learn whether food shortage truly was causing brood mortalities by observing parents feeding young on both healthy and acidic lakes, and looking for differences in feeding behavior. With the aid of a spotting scope, I was able to make accurate observations of foods eaten on two healthy lakes and on two others that were somewhat acidic but not totally devoid of fish. I learned that chicks on all lakes were given tiny food items and small fish during their first month; later they were fed mostly fish. More important, the parents on the acidic lakes had to dive more often than those on the healthy lakes to catch the same number of fish, suggesting that the acidic lakes had a lower fish density.

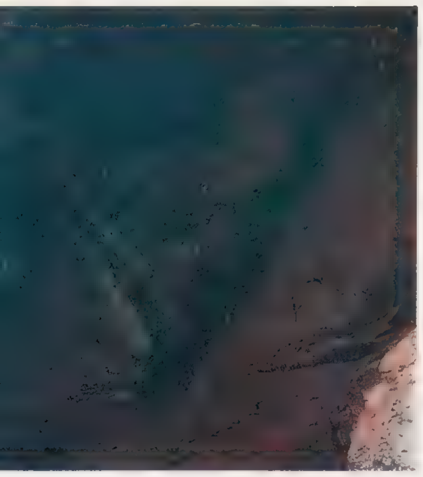
But just because loons were catching fewer fish on acidic lakes did not necessarily mean that chicks were getting insufficient food to survive. I needed more detailed observations, so in 1985, I set out to find an acid lake with a family of loons that I could watch carefully before the young died. I knew that a pair of loons on Marjorie Lake had lost its sole chick for two breeding seasons. I also knew that Marjorie Lake was acidic, fishless, and probably had few, if any, crayfish, frogs, and aquatic insects.

So for several days in late July I sat on the shore of Marjorie Lake watching the adult loons and their one- or two-week-old chick. They did not seem to mind my presence as long as I stayed sufficiently distant and remained still. Unlike the loons that I'd observed on the other four lakes, these birds remained in a small bay instead of cruising around the whole lake. Perhaps the lack of animal prey eliminated the need to comb more of the shoreline.

That wasn't the only way in which the Marjorie Lake loons behaved differently from those on the other four lakes. The parents at Marjorie fed their chick virtually every time they dove. I knew they weren't capturing fish, because I would have been able to see them. Besides, the loons' success rate was too high. My observations on the two healthy lakes had shown that when parents were chasing fish, their feeding success rate was only 23 percent. When they were securing vegetation and insects, they surfaced with food after 70 percent of their dives. The even higher success rate of the Marjorie Lake birds made me suspect that they were eating vegetation almost exclusively. The food items were usually too small to be seen through my scope, though I could sometimes discern small strands of algae hanging from the loons' bills.

The chick also acted strangely. Often it floated close to shore, sometimes among bushes hanging over the water. While paddling forward, the chick would stretch its neck toward an object on the water's surface, manipulate the object with its bill, then make

This young loon appears exuberant, but its days may be numbered. The clear blue water of its natal lake is beautiful to behold but empty of life-sustaining prey (below). Unless acid rain is diminished, the future of the loon and other fish-eating birds may be in jeopardy.



ROB ALVO

several gulping motions. I think the bird was catching whirligig beetles, which congregated on the surface in small sheltered areas.

When the chick was not being fed or feeding itself, it often rode on a parent's back. Instead of sitting upright in a typical posture, however, the chick often lay belly down at the rear of its parental surfboard, its feet dangling in the water. I believe that the chick was starving and weak, and despite the parents' efforts, was not obtaining enough animal food to remain healthy.

The parents did not seem to be feeding themselves on Marjorie Lake. I never saw a parent go off to forage in a different part of the lake as loon parents usually do. Instead, while one parent remained with the chick, the other flew from the lake and returned several hours later, presumably having fed elsewhere. I never saw a parent fly back to Marjorie Lake with food for the chick.

Based on my observations and my documentation of chick deaths on Marjorie Lake the two previous years, I was convinced that the chick would die. I wanted to observe the events leading to its death, but I couldn't stay at the lake indefinitely. I left after three days.

Two weeks later I returned. I paddled the length of the lake, pausing every few minutes to scan the surface with binoculars. The chick was nowhere in sight. Beaching the canoe at several points along the shore, I set up a tripod and searched through my spotting scope, to no avail. The chick was gone. Had it been abandoned by its parents after showing signs of weakness, and later picked off by a hawk or gull? Had it crawled ashore to take its last few breaths lying down? I checked the nest to see if it had returned to the only spot on land where it had set foot, but it wasn't there.

I looked at the water. It was a deep tropical blue, similar to a remote beach by the sea. It was inviting, and it tasted fresh and clean—because of the scarcity of tiny plankton, on which all lake organisms ultimately depend. I decided to spend some time with mask and snorkel to see what the loons' environment looked like from below.

A ghostly landscape lay before me. Rocks and fallen trees were covered by a carpet of threadlike algae, one of the only forms of life thriving in the altered water chemistry. Here and there clinging to rocks were a few dragonfly nymphs, possibly the only animal life remaining. On the rocky bottom 40 feet below, nothing moved except my shadow. Swimming back to my campsite I saw, still uneaten, the grains of rice that had settled to the bottom when I had washed dishes two weeks before. The lake, like the chick, was dead.

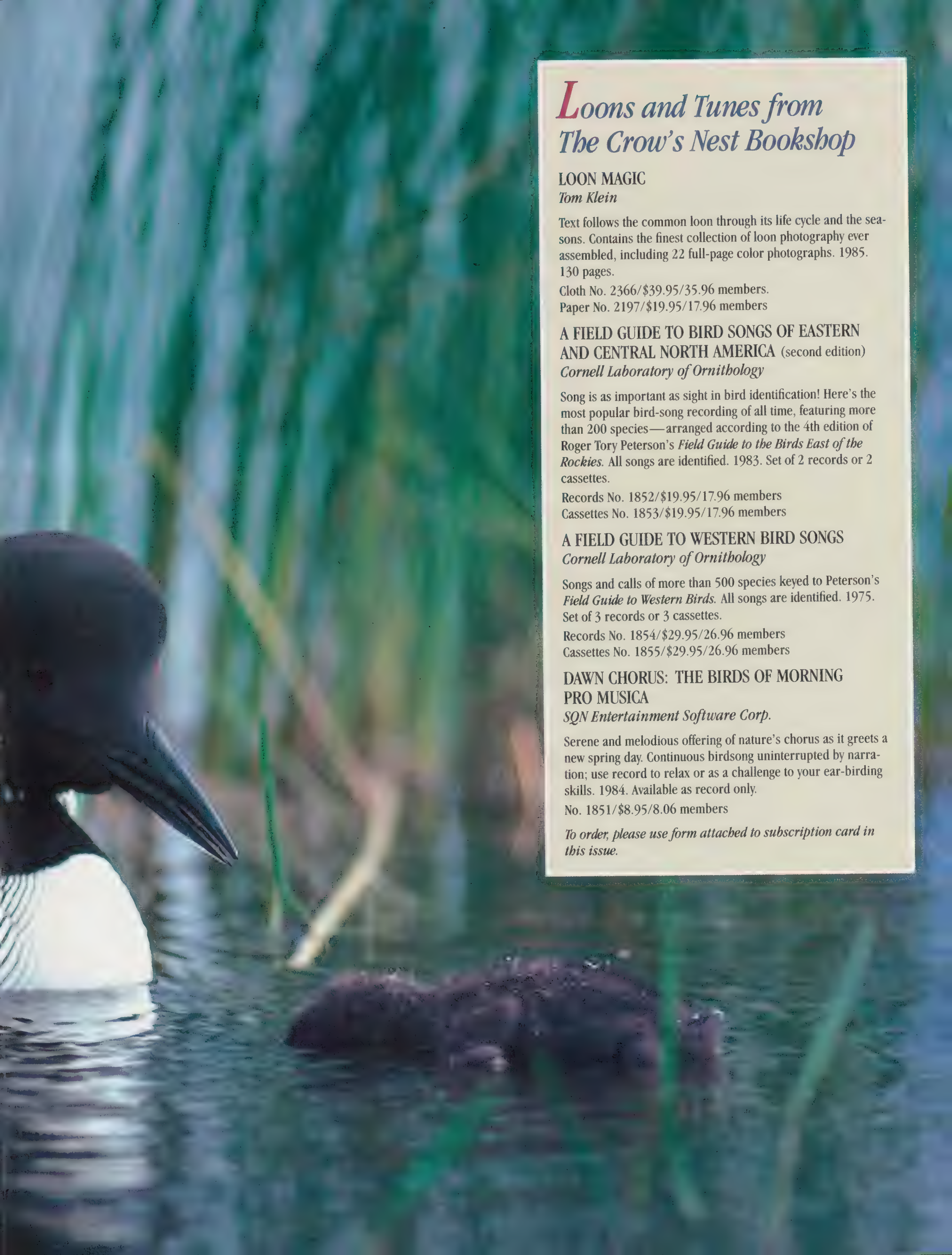
Suddenly I felt as if I were looking at my surroundings through the eyes of Peter Peloquin, and I knew what he had instinctively known so many years before. The clear blue lake had become too hostile even for the resourceful loon. □

Rob Alvo is a biological consultant with the Ontario Ministry of Natural Resources.

Further Reading

Alvo, Rob. "Lost Loons of the Northern Lakes." *Natural History.* September 1986.

Klein, Tom. *Loon Magic.* Paper Birch Press Inc., Ashland, Wisconsin. 1985.



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THE LIVING BIRD

Quarterly

Summer 1987

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CAUTION: Sudden Stops! In his first column for *The Living Bird Quarterly*, Pete Dunne—New Jersey's birding guru—considers the disconcerting correlation between birding and rear-end collisions.

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Front Cover: Malachite kingfisher, Kenya. This tiny bird—just five inches long—is found throughout much of southern Africa, where it lives near streams, quiet rivers, and small ponds. It feeds on small fish and dragonfly larvae, which it captures by plunging under water and immobilizes by beating against a rock or other hard object. Photograph by Tim Fitzharris. Thanks to Mrs. Sherwood W. Smith for her generous gift for printing our front cover.

Back Cover: Grosbeak weaver, Tanzania. This bird inhabits southern African swamps, where it builds a rugged, globular nest of extremely fine fibers. Photograph by Stephen J. Krasemann/DRK Photo.

159 SAPSUCKER WOODS RD.

Owls in Her Sleep

I want to thank Michael Harwood for bringing dream birding out of the bedroom ("Dreaming about Birds," Spring 1987). Unlike most of the people to whom he refers, I'm not really a bird watcher. In fact, just six years ago I was living (happily) not less than 500 yards from the New Jersey Turnpike, where the roar of trucks drowned out any sounds made by nearby birds.

But lured to the country by my husband, I became increasingly aware of the birds of southern New York State. One spring we discovered a broad-winged hawk's nest and, during weekly visits, watched the chicks grow to fledglings. Still, I'm a long way from keeping a life list.

But I *have* dreamt about birds. After reading Harwood's column last week, I dreamt about an owl. At least I *think* it was an owl. It seemed to be saying *whoo-whoo,* and it had pointed tufts on its head. . . .

Emily Wheeler
Lansing, New York

Misleading Pictures

There is a misleading trio of pictures in the article "Death on an Island" in the Winter 1987 issue. The article discusses the effect of the brown tree snake, *Boiga irregularis,* on the birds of Guam, and includes an adequate illustration of that snake on page 7. So what is the justification for including photographs of the African egg-eating snake in action on page 9?

The adaptations of the egg-eating snake, including the jaw dislocation well shown in the photographs, are unique among the snakes of the world and have nothing to do with the way the brown tree snake eats birds. But the caption, "The egg-eating snake shows the ease with which a snake can dispatch a large egg," clearly suggests that the brown tree snake can do the same thing. This borders on nature faking.

Kenneth C. Parkes
Carnegie Museum of Natural History
Pittsburgh, Pennsylvania

Too Thin

I am responding to your recent appeal for members' feedback about *The Living Bird Quarterly.* I have been a member of the Laboratory for over three years, and twice have been on the verge of not renewing my membership. Often, *The Quarterly* leaves me unsatisfied.

My complaint is that each issue is too thin. Thirty pages an issue is just not enough. And the small number of articles is a problem compounded by two other problems. Too often *The Quarterly* features very large illustrations of relatively uninteresting subjects, and on a few occasions, it has reprinted articles that have already seen wide circulation. I wish that the magazine could be transformed from a slim, slick magazine into a thicker, more substantive publication.

My solutions: extend each issue by 20 pages or more; abandon the huge spreads of decorative material; expand the number of articles written in a popular style by scientists. If these changes require you to accept advertising, so be it.

Chris Siddle
Fort St. John, British Columbia

Our thanks to these and all other members who have sent us comments about The Living Bird Quarterly. *Critiques are always welcome and will be read and considered carefully.*

FROM THE DIRECTOR

Publishing a magazine can be a lonely enterprise. Here at the Lab we work hard for many months to produce what we hope is a beautiful, interesting, and informative publication. Then we ship it out to our 12,500 members and wonder: Does anyone read it? If so, do they like it? And if not, why not?

Of course, we do get comments—from fellow staff, spouses, parents, neighbors met in the supermarket. Such comments are useful but not particularly objective. How could we find out what our readers really think? We decided to try a readership survey.

Experts warned us of difficulties: surveys are expensive and may result in misleading information. We solved the expense problem by keeping the sample small—300 Lab members—and by persuading my two sons that it was fun to stuff envelopes on a day off from school. We tried to solve the problem of biased responses by making our questionnaire as objective as possible. Nearly half of the members polled took the time to respond—an excellent return rate—and while we realize that our survey results may not be perfectly representative of our collective membership, they are nevertheless interesting. I'd like to share some of them with you.

Particularly heartening was the response to the first question, "How much of the magazine do you read?" More than two-thirds of the respondents claim to read at least 75 percent of each issue. Of articles that have appeared in *The Quarterly,* favorites included stories about bird conservation and a photo essay about penguins. The favorite regular column was "Watching" by Don and Lillian Stokes.

From a selection of articles that we are thinking about publishing, those that would be well received are "How to identify migrating hawks" and "Why do birds sing?" Of surprisingly limited interest would be an article on building bird houses. And of potential new columns, "Questions about birds from readers" is of most interest.

As expected, the possibility of including advertising in *The Quarterly* drew mixed reviews. Fifty-four percent of respondents approved, while 47 percent said they probably wouldn't like it.

These and other responses were encouraging and helpful as we plan future issues of the magazine. For example, we have already added a letters column that will be devoted to your comments and questions. We are thinking about publishing more information on bird identification. We'll continue to publish beautiful photo essays and articles on bird conservation.

We also plan to grow in size. Beginning with the autumn issue *The Quarterly* will have four extra pages. And to help pay for them, we have begun to accept advertising for quality products that we feel offer useful products and services for our members.

My thanks to all who responded to the survey. We're grateful for your help! And if you didn't respond, or didn't receive a survey, we're always open to comments. We'll read them with great interest.

CHARLES WALCOTT, Executive Director

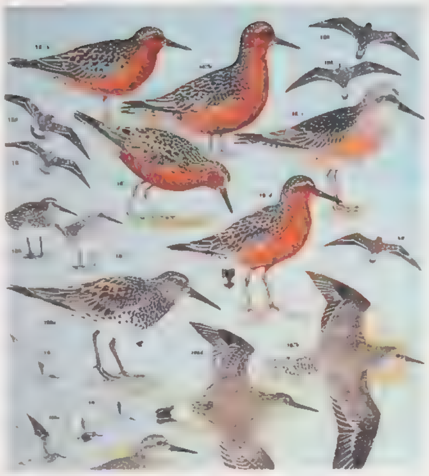


Plate from Shorebirds, © 1986 John Marchant, Tony Prater, and Peter Hayman. Printed by permission of Houghton Mifflin Co., Boston, MA.

Has identifying shorebirds ever caused you to shrug your shoulders in despair? Help has recently arrived in the form of a new field guide: *Shorebirds: An Identification Guide to the Waders of the World* by Peter Hayman, John Marchant, and Tony Prater (1986, Houghton Mifflin Company, Boston, 412 pages, $35.00, cloth).

This book offers something for birders of all abilities. Beginners, for example, will profit greatly from the introductory section on how to identify shorebirds, while advanced birders will appreciate the extremely detailed descriptions of each species. And any birder will value the 88 colorplates, which are accurate and aesthetically pleasing. At least 5, and up to 26, illustrations are included for each species. For most species all major plumages are illustrated, and important identifying features are highlighted in a brief text on the facing page.

Shorebirds will be a valuable addition to the library of any serious birder.

The roseate tern has been proposed for addition to the United States List of Endangered and Threatened Species by the U.S. Fish and Wildlife Service. The listing would classify the population that nests in northeastern North America as endangered, and the Florida and Caribbean populations as threatened. Roseate terns are declining largely because expanding numbers of great black-backed and herring gulls are displacing the terns from their nesting islands.

The last free-flying California condor has been captured and removed from the wild. According to Joseph Dowhan, condor recovery coordinator for the U.S. Fish and Wildlife Service, the bird had eluded capture for several months but was finally captured "without incident" on April 19, 1987. It was quickly taken to the "condorminium" at the San Diego Wild Animal Park. There it joins 13 other condors which, along with an additional 13 at the Los Angeles Zoo, are the last of the living California condors on earth ("The Condor's Last Stand," *The Living Bird Quarterly*, Autumn 1986).

Condor biologists hope that the captive birds will mate and raise young that can be reintroduced into the wild. So far, no California condors have bred in captivity. But last spring three of the captive pairs began courtship activity, raising biologists' hopes that some condors will become parents soon.

The Purple Martin Conservation Association was established in January 1987. It is a nonprofit organization dedicated to the conservation of the purple martin through scientific research, state-of-the-art management techniques, and public education. Through its colony registry program it will attempt to coordinate the management efforts of North American purple martin landlords. It will also implement a continentwide martin nest-record card scheme. If you know the whereabouts of a martin colony, or if you are interested in starting one, please write: James R. Hill III, Executive Director, Purple Martin Conservation Association, Institute for Research and Community Services, Edinboro University of Pennsylvania, Edinboro, PA 16444.

AROUND THE LAB

Jill K. Baringer joined the Laboratory staff last spring as the new manager of The Crow's Nest Bookshop. Jill comes to the Lab from California, where she received a M.B.A. from the University of California at Berkeley and worked as a cost accounting manager for Hewlett-Packard. In addition to managing the bookshop, Jill will serve as a business and marketing advisor to other Lab staff.

Project FeederWatch, a brand-new Laboratory program, will be launched this autumn. Volunteers throughout North America will record the birds that visit their feeders on one or two days each week throughout the winter. To participate, you must be able to identify the species that normally come to your feeder, and to keep an eye on your feeder for several hours on your chosen count days. Data will be entered on simple computer forms, and participants will receive an annual report on the season's results. A $7.00 registration fee for each participant will help cover program costs.

Project FeederWatch is based on an Ontario bird feeder survey that has been run for the last 10 years by the Long Point Bird Observatory, which will co-sponsor Project FeederWatch in Canada. Establishment of a feeder survey throughout all of North America should help biologists answer questions about birds' winter ranges in relation to weather; timing and extent of winter bird population movements; and winter food and habitat preferences.

Watch your mailbox for more information about this new program, or write to: Project FeederWatch, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Rd., Ithaca, NY 14850.

Birdhouses and Real Estate

Birdhouses are a creative way to help bluebirds, house wrens, and tree swallows, and real estate is a creative way to help the Laboratory of Ornithology.

A gift of real estate to the Laboratory can provide funding for specific projects or contribute to the Lab's operating endowment. A gift of property may also be a great way for you to take a charitable deduction and limit capital gains taxes. If you're ever wondering what to do with unwanted real estate, think of the Laboratory. We can turn the liabilities of taxes and ownership into a substantial benefit for the birds.

For more information, please contact: Scott Sutcliffe, Director of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Rd., Ithaca, NY 14850. (607) 255-4288.

Mr. Bent of Taunton, Mass.

Last winter was a hard one in southern New England. Nevertheless, in mid-April I heard a Carolina wren *tea-kettle*ing loudly in the scrubby field below my house. The foothills of the Connecticut Berkshires seemed a very unlikely place to hear a Carolina wren after such a winter; the species is more or less at the northern limit of its range here, and it is supposed to be vulnerable to cold, snowy weather.

So, as I regularly do when confronted by an ornithological puzzle, I opened one of the 26 volumes of Arthur Cleveland Bent's *Life Histories of North American Birds—Nuthatches, Wrens, Thrashers, and Their Allies*—to see what he had to say.

Like most of Bent's *Life Histories*, the Carolina wren essay, 12 pages long, is often chatty and lyrical. Characteristically, it draws upon observations made by dozens of amateur and professional ornithologists. It follows Bent's standard format: an introductory passage, then sections on every aspect of the bird's life—courtship, nesting, eggs, young, plumages, food, behavior, voice, field marks, enemies, winter behavior, range, records from outside the normal range, and egg dates.

If the wren were migratory, the essay would also include information about the bird's migrations. But, as Bent makes clear, the movements of the Carolina wren from place to place seem to be more in the nature of pioneering than migration. It has been pushing at the northern boundaries of its range for a long time, just like the mockingbird, tufted titmouse, cardinal, and turkey vulture, but not succeeding quite so well as they. The wren population increases in the North during sequences of mild winters and then suffers severe setbacks when winters turn harsh; in fact, the population seems to crash wherever hard winters occur—as far south as Washington, D.C., West Virginia, and Tennessee.

As I investigated the question of wren movements, I also read all kinds of other interesting stuff about the birds. They may build their nests either out in the open (on tree limbs and crotches) or in cavities (such as holes in trees and under roots, or in stone walls, mailboxes, old hornets' nests, pockets of clothes). The species is supposed to be very shy around humans, but one pair nested in a noisy blacksmith's shop, and another built in a hole in the back of a sofa in an occupied house. Carolina wrens eat insects, as one would expect, but they also feed on lizards, tree frogs, even snakes sometimes. And they not only sing the famous *tea-kettle* song that attracted my attention last April but also on occasion mimic other species, including pine warbler, scarlet tanager, and bluebird. Wow. In sum, the essay expanded my idea of Carolina wrens by a good deal and got my mind cranking about birds in general. That's the effect Bent's work usually has on me.

I went back to the bookcase and replaced the volume among its 25 companions. Together they take up more than two feet of shelf space. George Miksch Sutton once remarked that that row of books was in the same ornithological league as the accomplishments of John James Audubon and Alexander Wilson. Just to think of the work in terms of the time invested is dazzling: Bent agreed to undertake the project for the Smithsonian Institution in 1910, and he was still writing, editing, collecting, and corresponding with his hundreds of cooperators when he died 44 years later at the age of 88, with several volumes yet to be published.

Considering Bent's commitment and accomplishment, his relative obscurity today is remarkable.

Considering Bent's commitment and accomplishment, his relative obscurity today is remarkable. The only "biographies" of him are obituaries, and, being friendly and short, they provide only limited information about his life. So, for example, we can't even be sure why the Smithsonian asked Bent, of all the ornithologists in the United States, to take on the huge project in the first place.

He was an amateur, not an academic, ornithologist. He didn't reside in any of the seats of American ornithological power, either. He spent most of his life in Taunton, Massachusetts, a modest-sized industrial city south of Boston. He was born there in 1866, and after graduating from Harvard College in 1889, he began an exceptionally successful business career in the Taunton vicinity and on Cape Cod. That career lasted 38 years, until he was past 60. He managed firms as diverse as local electric power companies and manufacturers of printing presses and cotton-mill machinery. He was married, he had children and a strong sense of family, and he gave a lot of time to his community—in government, education, religion, and various clubs.

From his boyhood he had been a birder. "I was not too strong," he explained, "and my father encouraged nature activities." Birding toughened him up, all right. It made him into a daring tree climber, because any boy interested in birds in the 1870s was an egg collector. The collecting passion in turn led to an adventure that further colored his life. At the age of about 30 he shinnied up a tree to a barred owl's nest hole, using no rope or other climbing gear. As he was reaching deep into the hole, he lost his grip on the trunk and started to fall, and his arm became wedged at the bottom of the opening. He hung there, struggling, for 25 minutes by the distant village clock. (A friend remarked that it was characteristic of Bent to note the time in such a predicament.) Finally he wrenched himself loose and dropped. He wasn't hurt by the fall, but he was left with a permanent tremor in his right hand.

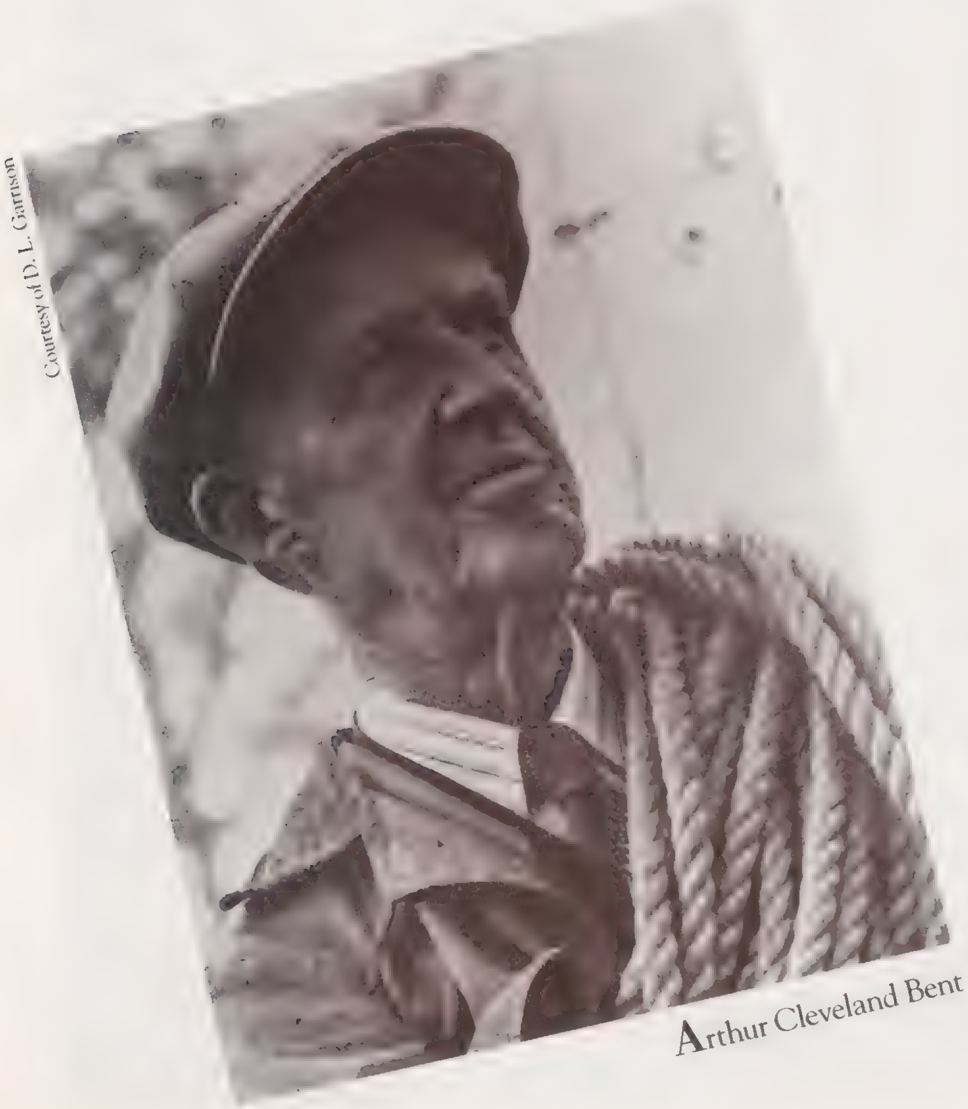
That didn't discourage him from further tree climbing. He became an increasingly active field ornithologist and collector of eggs and bird specimens. In all but three years between 1901 and 1930 he made expeditions to important North American birding territories—North Dakota, Saskatchewan, Manitoba, the middle Atlantic coast, Quebec, the Canadian Maritimes, Florida, Louisiana, Texas, Arizona, California, Alaska, and the Aleutians.

In 1901 he began contributing to *The Auk*, journal of the American Ornithologists' Union, and by 1910 he had published major papers on the nesting habits of various species in North Dakota and Florida, on the summer birds of Saskatchewan, and, with a coauthor, on the birds of Labrador.

At that point the Smithsonian asked him to take over authorship of a series on bird life histories, which had already been long in the making. It had been started in the 1890s by Major Charles Emil Bendire, honorary curator of oology at the Smithsonian. Bendire had published two volumes of the set, then died, and there the project rested.

The goal was to provide a detailed summary of knowledge about every species and subspecies of bird in North America. It was a complicated task. There were still many dramatic gaps in what was known, which was probably one reason the Smithsonian picked Bent: he had demonstrated an aptitude and passion for studying birds in the field and writing about them. Oliver L. Austin, Jr., who became editor of the series after Bent died, commented recently that Bent "was already doing it, so they just made it official." Another inducement must have been the fact that Bent didn't require a fee to carry out the assignment.

After assessing the situation, Bent decided that he would not simply pick up where Bendire had left off but would start fresh. "This is to be a comprehensive, up-to-date work on the habits of the 1,200 different kinds of birds known to occur north of the Mexican boundary," he told his Harvard classmates in their 25th reunion report in 1914. "It involves a vast amount of exploration, research, and compilation of data, the results of which will be published in six or seven large volumes...." That proved to be a gross underestimate. He was right about this, however: "[I]t will be my life's work."


Arthur Cleveland Bent

Courtesy of D. L. Garrison

The life histories contained his personal experiences, of course, drawn from many years of birding and many expeditions. But authorship meant that he also became compiler and editor of a great deal of other material. He drew on the published literature, using his own private index to that literature to complement an index compiled by the U.S. Biological Survey. ("There is no end to his filing arrangements," wrote a Taunton newspaper reporter who interviewed him just before his 84th birthday. "He has a systematic plan that allows him to put his hands on whatever material he needs for references, without the delay of searching.") Besides the information already in print, he relied heavily on the unpublished field notes that people mailed to him at Taunton. From the beginning this was a cooperative project, involving every professional and amateur he could proselytize. As he once put it, "I have friends writing to me, ranging in age from a 10-year-old boy to many persons over threescore and 10 years old."

He was just as happy quoting an obscure observer as quoting Audubon: Mrs. Lizzie T. Burt, evidently a neighbor, "described the notes of an adult [red-necked grebe], which was captured on the ice near my home . . . as loud trumpetings, suggesting the cries of the loon and resembling the sound made by what is known as a Gabriel's horn on an automobile." In his prefaces he formally acknowledged assistance and contributions of information from more than 800 individuals, and he credited uncounted others by name in the life histories themselves.

His first volume, *Life Histories of North American Diving Birds*, was published in 1919. *Gulls and Terns; Petrels and Pelicans and Their Allies*; and *Wild Fowl*, in two parts, followed in the next six years. Up to that point he had personally written almost all the essays in nearly 1,500 pages of text, but he knew he couldn't go on doing that and reasonably expect to finish. Beginning with *Marsh Birds* he regularly farmed out assignments to other ornithologists, although he continued to contribute the lion's share.

He gradually shed all his business interests. World War II halted publication for a while, and the Smithsonian sometimes incubated his finished manuscripts for years before publishing them. Fortunately, the formerly frail little boy had an exceptionally long life, and completion of the project was in sight when he died at the end of 1954. The next-to-last segment, *Blackbirds, Orioles, Tanagers, and Allies*, was ready for the press. Only the three-part set on the finch family remained to be finished. It appeared at last in 1968, 102 years after Bent's birth and 58 years after he accepted the assignment.

—Michael Harwood

LEGACY OF A LADY

LEN SOUCY

RESEARCHING the common barn-owl, *Tyto alba*, in the wild is not for everyone. Studying the bird is physically demanding, often dangerous, and financially unrewarding. So it's difficult for me to explain how I became attracted to such an endeavor. Why do I spend my spare time rummaging around silos and the rafters of decrepit barns instead of playing golf or duplicate bridge? The answer is simple: I'm fascinated with *Tyto*.

I'm not a professional ornithologist, I'm an engraver. My interest in birds began somewhat casually 30 years ago when I first started bird watching. After visiting Hawk Mountain Sanctuary in Pennsylvania I got turned on to raptors and have stayed that way ever since. I became a bird bander and a field researcher, and 20 years ago I founded The Raptor Trust, a raptor rehabilitation center in Millington, New Jersey, which has grown to be one of the foremost facilities of its kind in the nation. Through my work, I've learned that nonprofessionals can contribute to the science of ornithology. If we educate ourselves and are serious and dedicated, our contributions can be just as important as those of the "pros."

Raptor rehabilitator Len Soucy (left) holds Lady, a barn-owl that he raised from an egg found in an abandoned nest. Above: Barn-owl leaves its nest in a silo.

MILTON HEIBERG (left); LEN SOUCY (right)

My fascination with *Tyto* began nearly 20 years ago when someone found three barn-owl eggs in an abandoned nest and brought them to The Raptor Trust. One of the eggs hatched and I raised my first owl. I named her Lady. Unfortunately my knowledge of owl socialization was deficient in those days. I didn't realize that a young owl raised in captivity could become so imprinted on humans that it would be unable to lead a normal life in the wild. So alas, Lady's entire life—14 years—had to be spent in captivity.

But I made her life meaningful. Thousands of visitors to The Raptor Trust met Lady close up. She was photographed countless times, and pictures of her appeared in magazines, on calendars, and on television. For years she accompanied me to the lectures and programs on birds of prey that I presented to schools, Scouts, and nature clubs. Incidentally, I was deficient not only in my knowledge of owl behavior 20 years ago but also in owl physiology—for Lady was a male.

Through my long and intimate association with Lady I became fascinated with barn-owls. In my free time between work and lectures, I read everything on barn-owls that I could lay my hands on: books, articles, scientific papers. I discovered that biologists knew a great deal about the barn-owl, but much remained to be learned. For example, no one had ever conducted an in-depth study of the bird in New Jersey. So in 1973, I began a study of the barn-owl which is still under way.

For my study site, I selected two adjacent counties in northwestern New Jersey, Hunterdon and Somerset. Their combined area is 741 square miles. I chose this area because it is located near my home and I can survey all of it each year. Also, I believed that it contained everything required to support barn-owls: suitable habitat, roosting and nesting sites, and prey. And I was right, for during the past 14 years I've banded more than 1,000 young barn-owls, located nearly 80 nesting sites, and witnessed some 300 successful nesting attempts. Although barn-owl numbers are diminishing in many parts of the United States and in other countries throughout the world, I'm happy to report large numbers of them breeding in northwestern New Jersey.

One aspect of the barn-owl's biology I've investigated is food habits. Each day, owls regurgitate pellets containing the undigested remains of their prey. I've

LEONARD LEE RUE III

collected and analyzed thousands of pellets from nesting and roosting sites, and found that barn-owls are consummate rodent eaters. In New Jersey, *Tyto* feeds primarily on meadow voles and short-tailed shrews. In the study area these two common grassland animals make up nearly 95 percent of the species' total diet. Barn-owls also eat rats, mice, moles, birds, and insects, but not in great numbers.

I've also studied nesting habits. Historically, barn-owls have been cavity nesters, and in New Jersey many still nest in holes in trees. But somewhere along the line, for reasons unknown to me, *Tyto* developed a strong preference for living in human structures, close to people. I've found barn-owls nesting not only in trees, such as sycamores and maples, but also in barns, silos, church bell towers, warehouses, nest boxes, and water tanks. I've even found them under bridges, behind a drive-in movie screen, in a cement mixer, and once, 30 feet down a well.

JIM STAMEY

Because barn-owls live close to people, the birds are subject to numerous risks. Many are injured or killed by cars. Some barn-owls die when they eat rodents that have been poisoned, and a few are shot. Once I found an adult female and her four young dead in their nest on the floor of a water tank, shot in their own home. Because all owls and other birds of prey are now protected by law, such outrageous acts are not nearly so common as they once were.

My investigation has led me to a number of places where barn-owls have nested for many years, demonstrating the species' tendency to reuse successful sites. One man told me that owls have nested in his water tank for more than 50 years. The floor of the tank is covered with fur, bones, and other nesting debris to a depth of nearly three feet. Feeling like Leakey in Olduvai Gorge, I've sifted through the remains of tens of thousands of voles and shrews, testimony to the generations of feathered, flying mousetraps that have lived in the tank.

Yet another part of my study has focused on the barn-owl's breeding biology. I've found that breeding usually begins in March and may continue well into the autumn, a longer breeding season than most owls have. A few years ago, a six-week-old orphaned owlet found in Jersey City was brought to me on Christmas.

The number of eggs in a clutch averages from 3 to 6 but varies from 1 to 10. Incubation is done almost exclusively by the female and begins when the first egg is laid. Once she has started incubating she seldom leaves the nest, so her mate must provide all her food. The eggs hatch in about 32 days. Because the eggs are laid at nearly 48-hour intervals, they hatch at different times. One brood of owlets therefore contains siblings of various sizes. This staggered hatching seems to be a sort of natural insurance policy for owl survival; in years when food is limited, only the older, larger, and healthier nestlings survive to the age at which they can leave the nest.

The young, born with their eyes closed, are scantily clad in short white down and have elongated faces that make them look a bit like vultures. The owlets consume great quantities of food and grow incredibly fast. At one week of age each owlet eats its own weight in food daily. Therefore, for a brood of six, the parents must supply a minimum of a dozen rodents each night as well as enough food for themselves. From hatching until fledging, the brood could consume 800 rodents. At 8 weeks the young are fully grown, can fly well, and

LEN SOUCY

Len Soucy's barn-owl research has taken him to some precarious places, including the tops of rickety water tanks where the birds often nest (left, below). Young barn-owls are scantily clad in white down and have elongated faces that make them look a bit like vultures (far left). They feed primarily on small mammals that their parents bring to the nest, which becomes littered with remains of prey and other debris (left).

are hardly distinguishable from their parents. Fledging occurs at 9 or 10 weeks.

Both sexes look similar in plumage, and females are generally somewhat larger than males. Because of their dense feathering and long wings (up to three-and-a-half foot wingspan), barn-owls look more massive than they really are. Actually they have small bodies and usually weigh only about one pound.

Audubon Christmas Bird Counts have shown that barn-owls are uncommon in northern New Jersey during winter, a fact that my study has confirmed. A few individuals remain resident year round, but most leave. Where do they go? Do they ever return? To answer these questions, I've marked individual birds for recognition. I've banded unfledged, young barn-owls (usually at about five or six weeks of age) whenever possible, and adult birds whenever I could capture them. To date, I've banded approximately 1,000 young and 50 adults, and about 5 percent of these birds have been subsequently found. Most were dead and were reported by the people who found them. Some were captured alive by other owl researchers and released. From the recoveries of these banded birds, some answers about barn-owl movements are slowly emerging.

My birds have dispersed in every direction. Some have gone north to Massachusetts and New York, some west to Pennsylvania. Most have traveled south, however, to Delaware, North Carolina, Florida, Alabama, and even Bermuda.

The birds that flew to Florida and Alabama may hold the long-distance record for the species. Both had traveled 1,100 miles from their birthplaces. And the bird recovered in Bermuda had traveled nearly 800 miles, almost all over water; it was the first barn-owl banded in the United States ever found in Bermuda. All of these long-distance flights have been made by young owls. These birds, not yet mated and lacking territories of their own, seem to be vagrants in their early lives. The wanderlust possessed by young barn-owls, as well as by the young of some other species, seems to be one factor that enables species to expand their ranges.

In June 1986, while conducting my annual breeding survey, I had the pleasure of meeting an old friend. I captured a banded female nesting in a water tank near South Branch, New Jersey. She had four young. A check of my records showed that I had banded her in nearby Lamington when she was five weeks old, in June of 1977—exactly nine years earlier. That's a long time for a barn-owl to survive in the wild. Captive birds have been known to live 20 years, but a wild bird's average lifespan is only 2 to 3 years.

It's true that I'm hooked on barn-owls. Like others so afflicted, I can't help it. Once I tried to kick the owl habit. I took up golf: couldn't control my slice; I quit. I took up bridge: couldn't control my cheating; I was asked to quit. Back to the owls, where I obviously belong. □

Len Soucy is founder and director of The Raptor Trust, a private, nonprofit organization dedicated to the preservation and well-being of birds of prey. The trust offers educational programs and operates a raptor rehabilitation facility, and is located at 1390 White Bridge Road, Millington, NJ 07946. (201)647-2353.

Further Reading

Bunn, D. S., A. B. Warburton, and R. D. S. Wilson. *The Barn Owl.* Buteo Books, Vermillion, South Dakota. 1982.

Burton, John A. (ed). *Owls of the World.* Peter Lowe, Great Britain. 1984.

Wet Socks and White Birds

CHRISTIAN AUTOTTE

GORDON LANGSBURY (BRUCE COLEMAN LIMITED)

CHRISTIAN AUTOTTE

Bonaventure Island, off the coast of the Gaspé Peninsula in eastern Quebec, is a bird watcher's paradise. Summer home to thousands of seabirds including black-legged kittiwakes, razorbills, and common murres, it contains the largest colony of northern gannets in North America (left). Nearby Percé Rock (below) is named for the gaping hole through its middle.

GASPÉ PENINSULA in eastern Quebec is a fat finger of land that protrudes into the cold waters of the Gulf of St. Lawrence. Roughly at the tip lies Percé. During most of the year this isolated village resembles other small coastal communities that time has forgotten. Empty and desolate, its buildings huddle closed and shuttered for the long winter. But for a few weeks each summer, the town comes alive as hordes of tourists pour in from around the world.

Most people come to Percé to see its two star attractions: Percé Rock and Bonaventure Island. The rock is a monolith that gives its name to the locality. In French *percé* means "pierced," and Percé Rock contains a gaping hole, 1,545 feet long and 288 feet high.

Near the rock is Bonaventure Island. Approximately two miles from shore and two miles in diameter, Bonaventure is a bird watcher's paradise. Each summer nearly 100,000 seabirds nest on the island. Black-legged kittiwakes glide in graceful circles before vertical cliffs, while razorbills and common murres perch on the sheer rock walls. Black guillemots bob like corks on waves. Great black-backed and herring gulls follow fishing boats, hoping for handouts, while double-crested and great cormorants fish for themselves or perch with their wings open to dry.

Then there are the northern gannets. They're hard to miss; Bonaventure is summer home to the largest gannet colony in North America, containing more than 45,000 of the big white birds. And the colony is easy to visit. From mid-June until the end of August, a flotilla of sturdy boats shuttles back and forth between Percé and the island, ferrying visitors to the rare and awe-inspiring sight.

I paid my first visit to Bonaventure some five years ago and vowed to return. Now, I'm back to spend a few days photographing gannets in the July sunshine.

It's midafternoon as I step down from the bus and pick up my backpack. The street air feels hot and muggy compared with the cool comfort of the bus.

The village is a madhouse of tourists and the attendant boutiques, seafood restaurants, souvenir shops, hotels, motels, and campgrounds. Vehicles of all kinds—including compact cars and huge motorhomes—rush in every direction. Their license plates range from as far south as Florida and Texas to as far west as British Columbia and California.

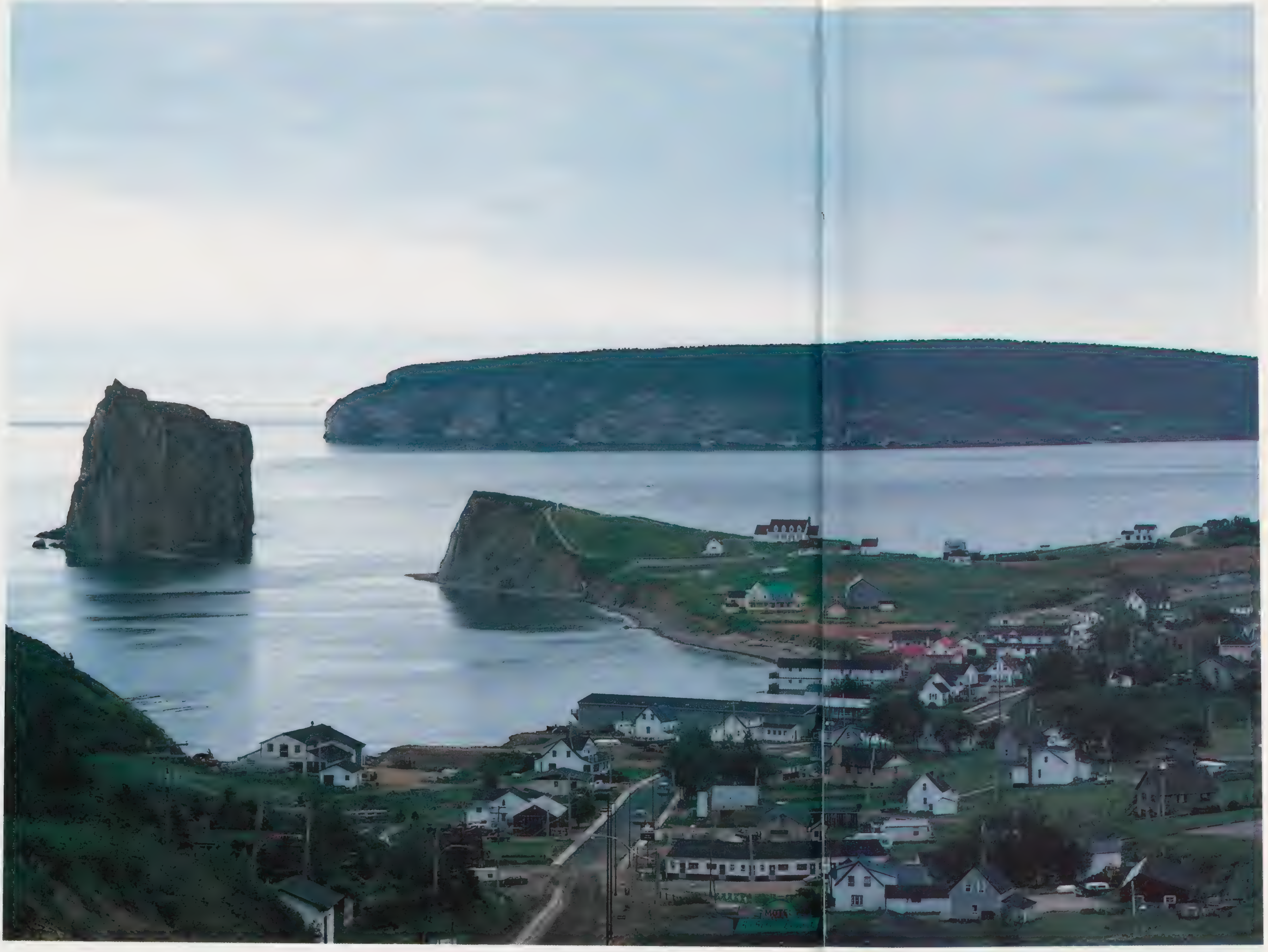
I manage to reach the provincial campground without being trampled on or run over. The view from my assigned campsite is a sliver of Percé Rock looming over a cluster of small shops. Oh well, I won't be spending much time in the campground. As I set up my tent the sun disappears behind a wall of heavy clouds. A bad omen? If so, I disregard it. I need a shower, anyway.

The next morning I have breakfast under a gloomy sky. After eating, I dress for the worst: raincoat for me, plastic bags for my cameras. By 8:00 A.M. I'm in line to board the first boat to Bonaventure.

Most of my fellow travelers look like ordinary tourists. Several, however, are loaded with binoculars and well-worn field guides. One traveler, a respectable-looking gentleman accompanied by his wife, keeps asking about the possibility of spotting a black-backed woodpecker, probably a conspicuous hole in his life list.

Soon the captain welcomes everybody aboard ship. I walk straight to the open aft deck and sit next to a quiet, well-dressed man burdened with cameras. Contrary to my first impression he is not a professional photographer but a retired engineer from South Carolina who takes nature pictures for fun. He explains that he visited the island the day before but can't stay

During summer, boats to Bonaventure leave daily from the old fishing village of Percé (right). While the village has become a tourist attraction filled with boutiques and souvenir shops, Bonaventure has been made a provincial park and stands as it did in the earliest days of colonization. The only signs of past human habitation are a few old buildings (below).



CHRISTIAN AUTOTTE (2)

away. I know the feeling.

The boat gets under way and heads for Percé Rock. It's low tide, and a few people have walked all the way out to see the hole. On the rock's flat top, which is accessible only to birds, we see colonies of double-crested and great cormorants. We pass by, change our bearing, and head straight for Bonaventure. As we hit the wharf, my new acquaintance and I have the same idea: waste no time and go for the gannets! The shortest route to them is The Colonies Trail, *Le Sentier des Colonies*, a two-mile walk, uphill and through the woods.

We start walking. Soon the trail steepens, and we're both out of breath as we enter the forest. Then the trail levels and walking becomes easy. Firs and spruces grow densely around us. Hair lichen—the Spanish moss of the North—hangs in tatters over branches, while yellow and green lichens grow in colorful patches on bark. Daisies and dense carpets of bunchberries grow profusely on the forest floor.

We hear a noise. I don't see anything, but my companion thinks it's a fox. Could be. Although no reptiles or amphibians live on Bonaventure, a few mammals have found their way to the island by crossing the ice during winter. Later we see potential fox prey when a snowshoe hare bursts out from under a boardwalk and poses. We could shoot some great pictures if the light were better.

ISLAND OF THE PAST

Bonaventure today is a sanctuary where seabirds reign and humans are mere visitors. In the past, however, the birds weren't so fortunate. From the mid 1600s until the early 1960s, Bonaventure boasted a year-round human population that peaked in 1831 at 132 people. Most early residents were fishermen-farmers who lived off the land and vast populations of cod that flourished in the Gulf of St. Lawrence. It was a harsh life. Local seabirds were regarded as a much needed food source, and many birds ended up on the dinner table.

Also eaten were the birds' eggs. In fact, seabird egg gathering began as far back as the 16th century, long before there was a permanent settlement at Percé. When fishermen from Europe arrived at Bonaventure each May, they broke all the seabird eggs they could find, forcing the birds to lay new clutches which ensured a regular supply of fresh eggs.

Need soon became tradition. Egg collecting continued for decades, with disastrous results for seabirds. By 1914 Bonaventure's gannet population had dropped to a mere 8,000 birds, prompting P. A. Taverner, a famous Canadian naturalist, to ask for government intervention. His plea was finally heard in 1919 when the Canadian government established a bird sanctuary on the eastern part of the island to protect the remaining colonies.

Human residents remained on Bonaventure a while longer, their numbers dwindling yearly. Some people died and were buried on the island. Others fled the isolation, which was especially intense in winter when ice made traveling to the mainland difficult. By 1964 Bonaventure had only summer residents, more than half of whom were Americans.

Worried that the island would turn into a vacation spot, the government of Quebec bought Bonaventure in 1971 to establish a park in which the birds and their habitat could be protected. Summer cottages were torn down; a few old buildings were left as a legacy from the past.

Today, under the administration of Quebec's Department of Recreation, Fish and Game, Bonaventure stands as it did in the early days of colonization. The island is open to the public from the last week of June until the end of August. The best time to visit is July, when every nest contains an egg or young, and adults fly back and forth as they feed their broods.

For a free information package on Bonaventure Island, write to: Department of Recreation, Fish and Game, Place de la Capitale, 150 East St-Cyrille Blvd., Quebec City, Quebec, Canada G1R 2B2. —C. A.

Gannets nest on the ground, defending tiny territories that extend as far as their necks can stretch (below). Birds that wander among nests may provoke fights lasting for hours (right). Chicks are never left alone, because they would fall prey to marauding herring gulls. So, when a gannet wants to leave its nest, it alerts its mate by moaning and pointing to the sky (right, center). Silent during much of the year, gannets call raucously while nesting (far right).

N. G. BLAKE (BRUCE COLEMAN LIMITED)

While we commiserate about the weather it gets worse. A downpour forces us to take refuge under the dense canopy of spruce and fir. Maybe I should have stayed in my warm, dry sleeping bag. We stand under the trees for some time, getting soaked and feeling frustrated. Every now and then we look up, hoping for an end to the deluge. Finally the rain tapers off, but a drizzle falls as we resume walking.

The wind blows in our faces, and soon we have our first sign of the gannets—a faint but distinctive smell. Not a stench, just an unmistakable fragrance. A few minutes later we hear the birds' raucous calls, then we walk out of the woods into full view of the closest gannet colony.

The experience of seeing thousands of birds packed into one place is incredible. As we look around in disbelief, we're assaulted by a multitude of swaying and bobbing images. But after a while behavioral patterns start to emerge.

Here and there a few birds with wings half unfolded shake their heads and point to the ground. These are males that have established territories and are looking for mates. Some bachelors will continue the pointing behavior all summer, even after it is too late to find a partner and breed successfully.

All around the unpaired males, luckier birds stand guard beside their newly hatched young. Chicks are never left alone, because unprotected chicks would fall prey to marauding herring gulls. When an adult wants to leave its nest, the bird alerts its mate by moaning and pointing to the sky. Then the three-foot-long bird takes to the air with great difficulty. It either hops to the edge of a cliff and jumps off, or finds its way to the "take-off strip," a straight area devoid of nests set at the edge of the colony. Once airborne, the gannet is a strong and graceful flier.

Still other birds return to their nests from fishing forays and are greeted by their partners with "mutual fencing." Face to face, the birds hold their heads high and frenetically rub their beaks together. All of these behaviors take place amidst a cacophony of raucous calls. Silent during winter, gannets seem to save their voices for the breeding season.

But bad weather prevents us from really enjoying

GREGORY G. DIMIJIAN (PHOTO RESEARCHERS, INC.)

CHRISTIAN AUTOTTE

MORE ON GANNETS

GEOFF DORÉ (BRUCE COLEMAN LIMITED)

The northern gannet, *Sula bassanus*, is the only member of the booby family that lives in the northern hemisphere. Outside North America, breeding colonies are found in the British Isles, on the Faeroe Islands (Denmark), and in Iceland. In North America, the bird nests on Bonaventure, Anticosti, and Magdalen islands, all in the Gulf of St. Lawrence, and on Cape St. Mary's and Funk and Baccalieu islands of Newfoundland. North American gannets winter along the eastern coast of the United States, from Massachusetts south to Florida.

Gannets arrive on Bonaventure around mid-April. Banding studies have shown that mated pairs return to the same nest year after year. The birds mate in early May and brood their single egg for about 41 days; the young take three months to fledge.

Southward migration begins toward the end of September, with adult birds leaving first. This is a trying time for young gannets: too fat to fly, they jump off cliffs, then fall or glide to the sea. They survive on their body fat for several weeks until their wing muscles are strong enough to allow sustained flight. Even then, inexperienced in the art of fishing, many starve before learning to feed themselves. Only 26 percent of young gannets survive their first year; only 18 percent reach adulthood.

Nevertheless, Bonaventure's gannet colonies are growing at a steady rate. Government biologists monitor the health of the colonies by conducting a gannet census every five years; these counts have revealed that the birds increase their numbers by about 1,500 to 2,000 birds each year.

Juveniles often spend several years away from the colonies, foraging along the coast or wandering far at sea. Their plumage, initially a mottled brown, turns white with every molt; they attain pure white plumage by their fourth or fifth year. Although some birds mate at four years—still showing traces of brown in their plumage—most don't find a mate for several more years.

Northern gannets are large birds, measuring 34 to 40 inches in length and 6 feet across the wings. They live on small fish such as capelin, herring, and mackerel, which they capture with their long, pointed bills. To catch its prey, a gannet will often plunge from heights of 50 to 100 feet and reach underwater depths of 50 feet. Air sacs in the chest, neck, and shoulders help to absorb the shock of impact. —C. A.

BHL

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Bird watchers bored with gannets can turn their attention to other interesting birds that nest on Bonaventure. Black-legged kittiwakes, a type of gull, nest in large cliff colonies. They are often seen gliding from the cliffs like snowflakes on a calm winter's day, calling out their names: *kittiwake, kittiwake, kittiwake*.

GEOFF DORÉ (BRUCE COLEMAN LIMITED)

the spectacle. Once again the rain falls hard, and we're standing in the open. Recalling from my first visit a nearby observation tower that may offer some protection, I suggest that we head for it.

The tower overlooks the largest of the island's five gannet colonies. From its top, three stories high, the view is stunning. Birds stretch into the distance to the left and the right like a midsummer snowfield. But there is order to the mob. From our vantage point, spacing between the nests becomes obvious. Gannets establish territories that extend as far as their necks can stretch. The territories are defended feverishly, and birds landing or wandering among the nests provoke quite a stir in their immediate vicinity. Fights between neighbors may last for hours.

It's cold and windy on the tower, a dreary day by most standards. But I'm so captivated by the birds' antics that I soon forget about my wet socks and stiff fingers. I don't even notice when my new friend leaves. I find him again in midafternoon, sitting with his huge zoom lens propped against the fence surrounding one of the colonies. We exchange a few words, then turn our attention back to the birds. I don't see him again until the next day, when we meet briefly in town. We never introduce ourselves.

Later in the day the weather finally improves. The wind dies down, and the cloud cover breaks up letting some sunshine through. The trip back to Percé provides another treat: a pod of small whales swims on a course parallel to our boat. They're too distant to photograph or even to identify, but close enough to excite everybody. It hasn't been such a bad day after all.

I return to Bonaventure two days later when the sun has finally broken through the clouds for good. This time I stay on the boat for a full tour around the island. Except for the west side, it is surrounded by an almost unbroken vertical cliff dotted with thousands of nesting seabirds. As the boat nears the cliff we see row upon row of gannets tightly pressed together on ledges and in deep horizontal crevices. Here and there, thin black-and-white dotted lines are all we can see of common murres and razorbills. Graceful kittiwakes drop off the cliff and glide down like snowflakes on a calm winter day, calling out their names: *kittiwake, kittiwake, kittiwake. . . .*

The sea is choppy today, and the few photographers on board provide unexpected entertainment as they try to stand up for a better view, keep their balance, and handle their cameras, all at the same time. Shooting with a long lens, I need both hands on the camera. I finally get my sea legs but not before a near disaster that almost sends me nosediving into the lap of a dignified elderly lady. Suddenly everybody is smiling.

The captain stops the boat at the base of a cliff. Somewhere on a ledge above are the nests of a small group of common puffins. These birds are rare in Quebec and only five pairs are known to nest on Bonaventure. Someone with binoculars claims to see one. I strain my myopic eyes in vain.

Back on the island I quickly leave for the gannet colonies, and once again I fall under the spell of the big white birds. It's windy today and a number of gannets are always in the air, flying against the wind in a predictable pattern. Nearly anyone could take good pictures under such conditions.

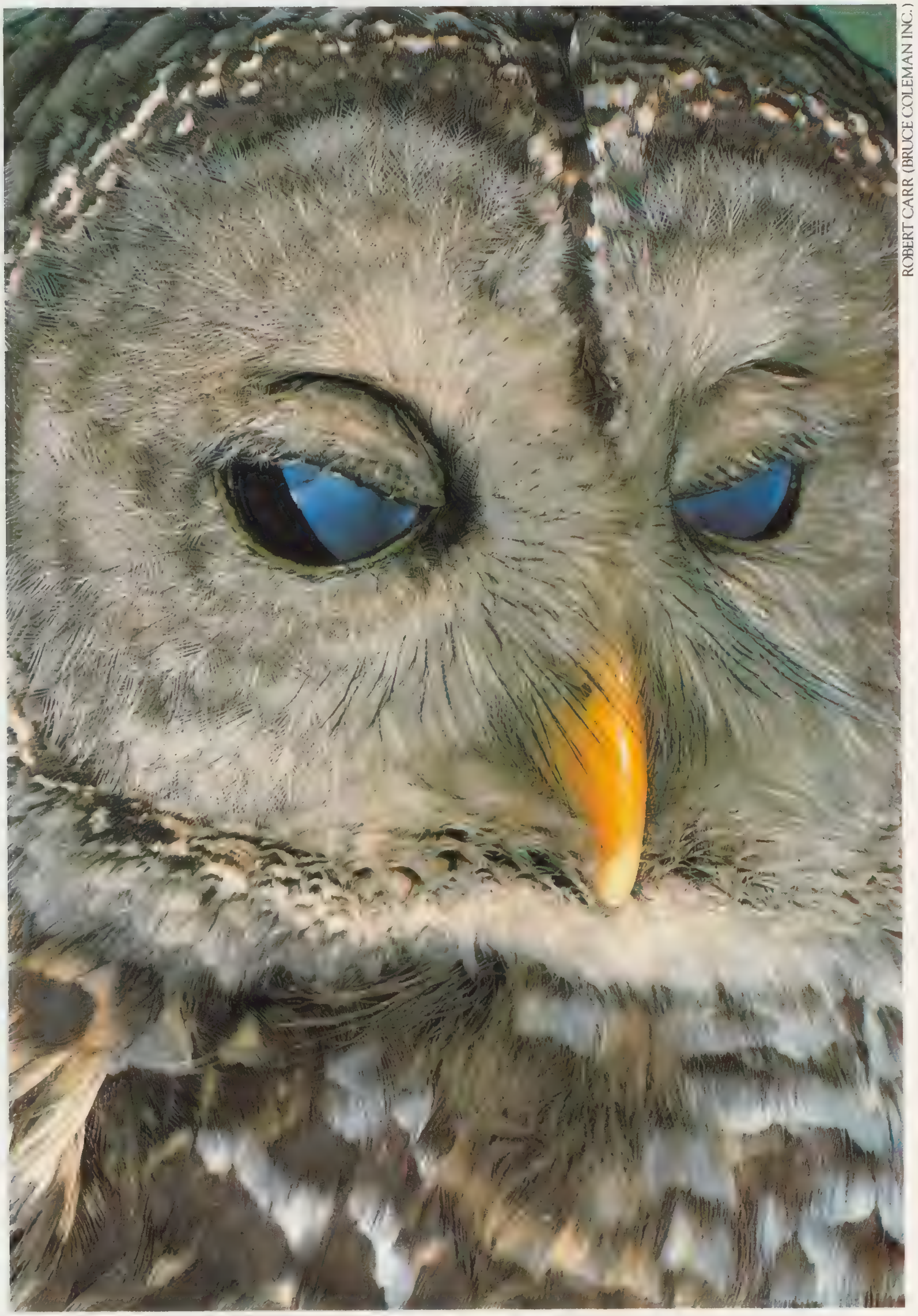
Later I stop to chat with Rachelle Thibault, a biologist working for Park Quebec, whose knowledge of gannets is encyclopedic. She tells me, for example, that a gannet eats one pound of fish per day. Multiply that by the 45,000 birds living on Bonaventure, and you can appreciate the fertility of the surrounding ocean waters.

Eventually I leave Rachelle to take some more photographs: kittiwakes in a small cove; an old house built last century; Percé Rock. Regretfully, this is my last day on Bonaventure. Tomorrow, as the bus is leaving Percé, my ears will ring with the calls of seabirds, and in my mind's eye I will see gannets flying against the wind. The island will have cast its magic spell on me, and it won't be long before I return again.

Christian Autotte is a freelance wildlife photographer based in a small town in southern Quebec. He is a regular contributor to The Young Naturalist Foundation, The Canadian Nature Federation, and The Cousteau Society.

Further Reading

Godfrey, W. Earl. *The Birds of Canada.* National Museums of Canada. Ottawa, Ontario. 1986.



ROBERT CARR (BRUCE COLEMAN INC.)

The Blue Blink

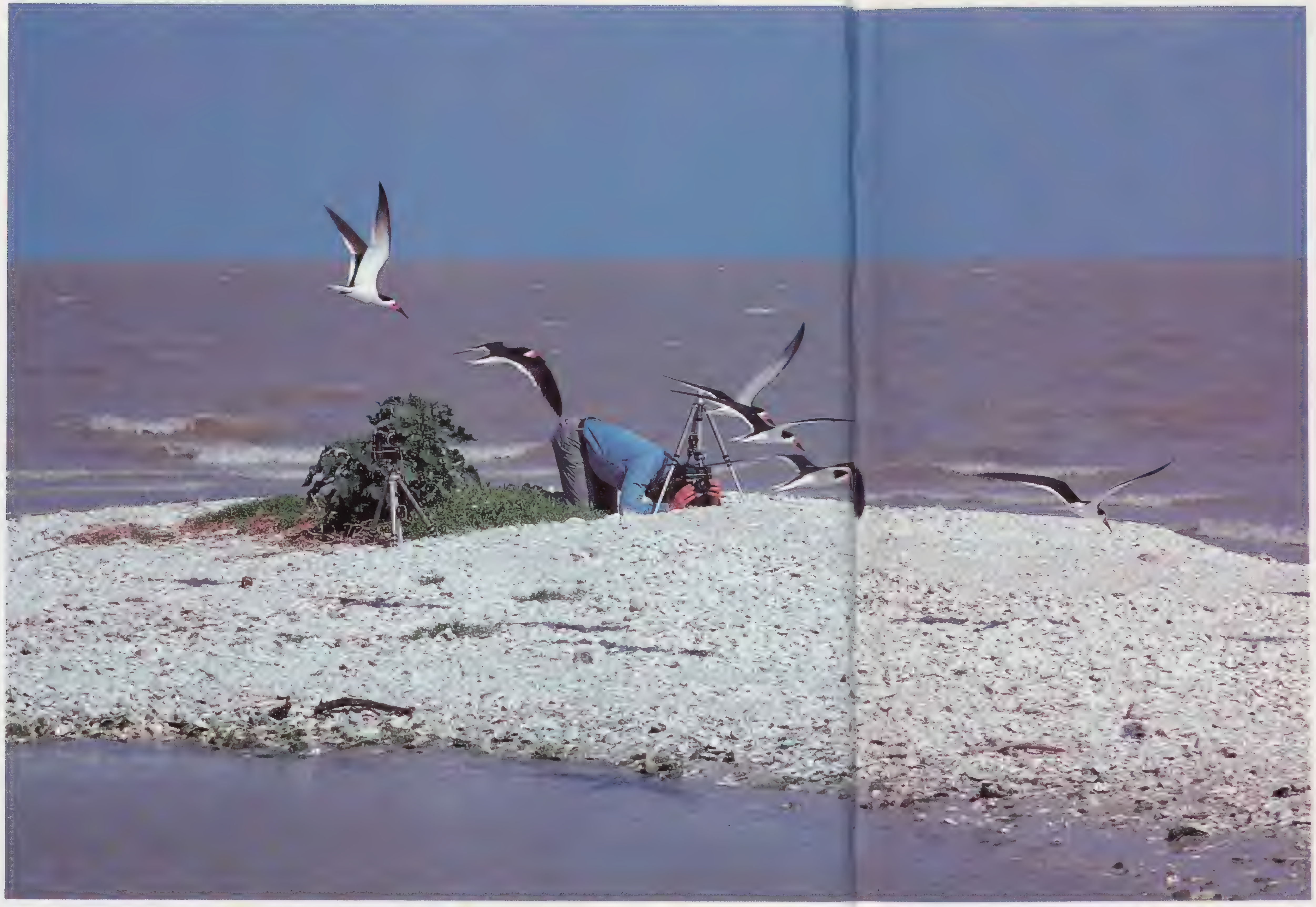
Birds blink, but usually not by closing an eyelid. Instead, they unfold their *nictitating membrane,* or "third eyelid"—a thin membrane that lies under the true eyelid, tucked into the corner of the eye toward the bill. The inner surface of the nictitating membrane is covered with thousands of cells that have microscopic brushlike projections, so that each blink of the membrane sweeps the eyeball with tears, keeping the eye moist and clean. In birds active by day, the nictitating membrane is translucent and can be drawn across the eye without completely shutting out the light. But owls, like the barred owl above, have nictitating membranes that are opaque.

All in a Day's Work

Choosing photographs to illustrate a magazine can be hard work. As we put together each issue of *The Living Bird Quarterly* we sort through dozens of envelopes stuffed full of pictures, squint for hours through photo magnifiers, and engage in lengthy debates over the merits of many pictures we see. It's a tiring job, and headaches are common. Sometimes we forget that we're having fun.

Then along comes a photo that makes us laugh. Usually it's a funny-looking bird—an owl that seems to have its head on backward, for example, or maybe a blue-footed booby, which is always good for a chuckle.

But recently we've discovered that bird photographers often look funnier than their subjects. Over the last few months we've seen several shots of photographers at work which have reminded us that taking good bird photos is even harder than selecting photos for our magazine. On these pages we share some favorites with you. —*The Editors*



Art Wolfe photographed his friend Ray Hoffstatter (right) attempting to take pictures of gray jays at Mt. Ranier National Park in Washington. "We were bringing them in close with peanuts," Art says. "Gray jays are very aggressive, and they were landing on our cameras, shoulders, even our heads, looking for more food." (Ray is the one on the left.)

Steve Wilson (ENTHEOS) took the self-portrait (above) on the Intracoastal Waterway near Mustang Island, Texas. "I was photographing a black skimmer nest," he explains. "This picture shows me setting up my tripod and framing the nest through my camera lens. Once I got the camera focused I left the area and hid nearby. The birds returned to the nest in minutes—they ignored the tripod—and I watched them for several hours through binoculars. When I wanted to take a photo I tripped the shutter by radio control."

Frank W. Mantlik took this shot of fellow photographer Townsend Dickinson at the Jamaica Bay National Wildlife Refuge on Long Island, New York. "Townie was trying to get a different perspective on some semipalmated sandpipers," Frank explains. "At Jamaica Bay you often see photographers in weird positions. And most of them get pretty muddy."

BHL

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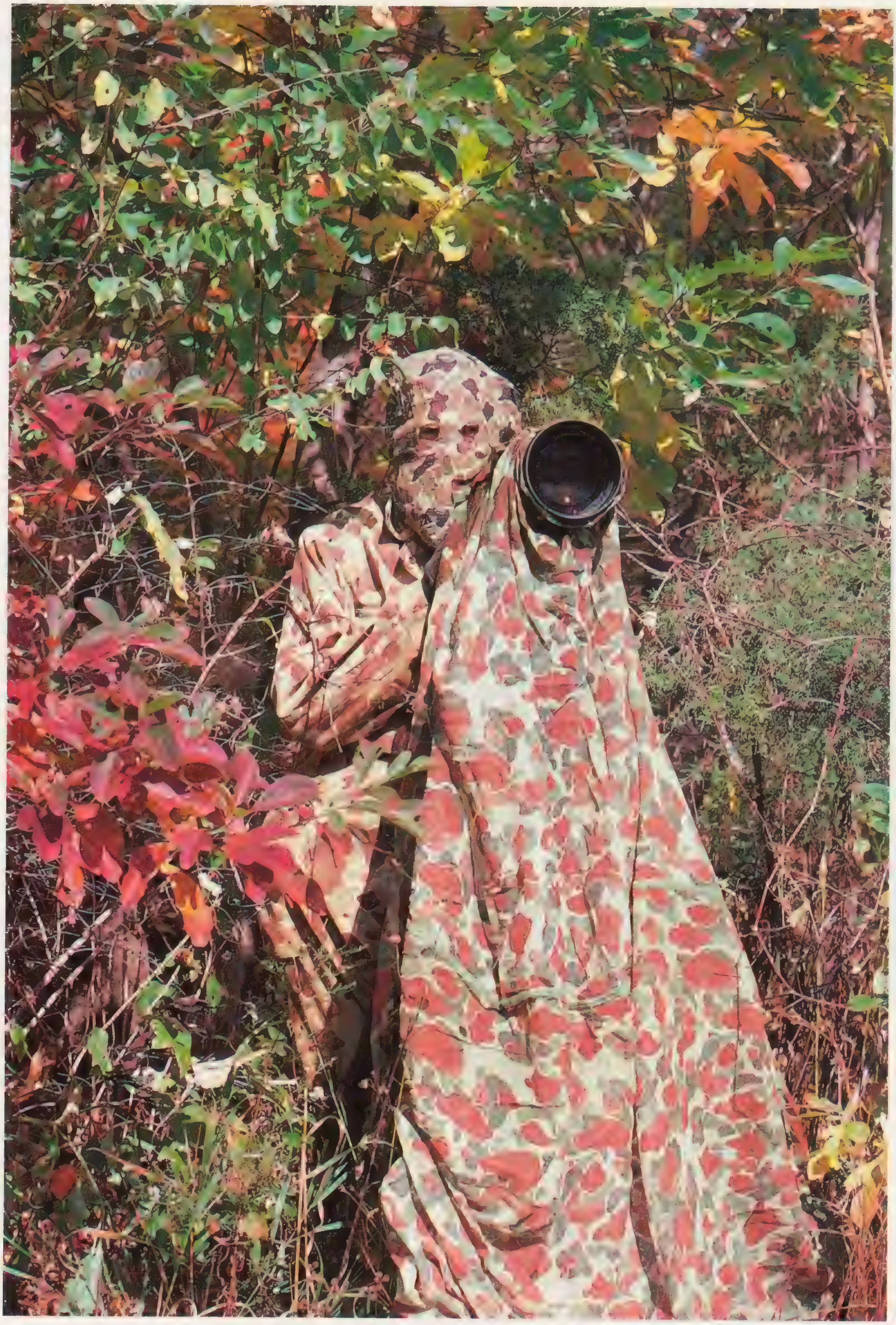
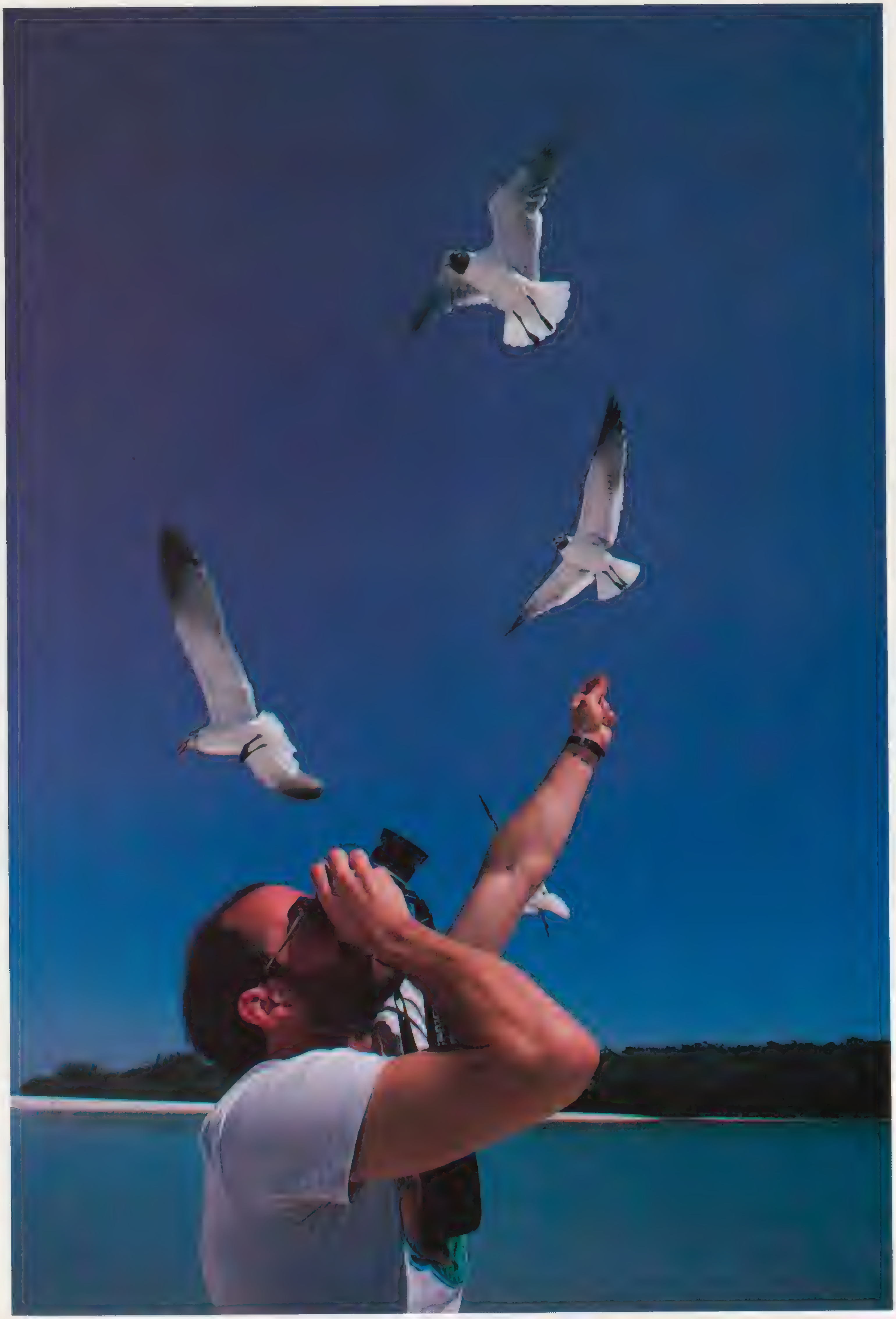
As far as we know, Leonard Lee Rue III is not a trained terrorist. Still, we're not sure we'd want to meet him in the woods, where we're told he never ventures without camouflage. Above, Rue stalks birds with his camera mounted on a gunstock, which helps to hold the camera steady. Photo by Mark Wilson. Right, Rue in quest of wild turkeys, among the wiliest birds in North America. Photo by Irene Vandermolen.





Darrell Gulin took this photo of Denver Bryan baiting laughing gulls on Sanibel Island, Florida. "We were trying to get some wide-angle shots," Darrell says, "and we wanted the gulls to come in close. We discovered that they loved corn chips; in fact, they snatched them from our fingers. Once the gulls were circling around us, we lay on the ground and shot straight overhead. We got some great photos, but we spent a lot of time cleaning white goo off our lenses."

No Place Like Home

JOHN C. KRICHER AND WILLIAM E. DAVIS, JR.

JOHN KRICHER

Kricher and Davis have discovered that the ovenbird, above, is among several species of migrant birds in which individuals return to the exact same tropical wintering sites each year. They've also learned that different types of tropical habitats, such as land cleared for agriculture (below right), support different species of wintering birds. Above right, Kricher shows a white-collared manakin—a tropical species—to some Kekchi Indians.

"I think you're gonna like this." Wayne Petersen, our research associate, had just brought us a wood thrush, and the look on his face said that it was no ordinary bird. As he held the nervous creature we saw immediately the source of his enthusiasm. The thrush had a band on its right leg, #951-17904. A quick check of our records showed that we had captured and banded the bird one year earlier almost to the day, in the same net, at the same location.

Had we been on the bird's breeding ground, the recapture would not have been surprising. Since J. J. Audubon's pioneering banding efforts in 1804, when he placed silver threads on the legs of nestling eastern phoebes, banding studies have repeatedly shown that birds ranging from waterfowl to warblers tend to return year after year to the same nesting sites. Intimate knowledge of a breeding area probably helps a bird to avoid predators and find the food needed to sustain itself and raise its young, so that natural selection has favored the evolution of *nest-site fidelity* in many migrant birds.

But we weren't on the bird's breeding ground. It was January, and we were on the bird's winter range in the lush vine- and orchid-laden forest of southern Belize, Central America. Therefore, our finding was particularly exciting. It showed that wood thrushes return to the same wintering areas each winter, just as they return to the same breeding territories each summer.

We had come to Belize to look for evidence of *winter-site fidelity* and to learn what kinds of habitats are used by North American migrants wintering in the tropics. Our project involved netting and banding birds in various habitats in and around Blue Creek, an Indian village at the base of the Maya Mountains, in an area called the Toledo District. With us were several volunteer assistants from Earthwatch, a nonprofit organization headquartered in Belmont, Massachusetts. Earthwatch provides volunteers as well as financial support to ecological field studies that can effectively put volunteers to work.

The village of Blue Creek is inhabited by a population of approximately 160 Kekchi Indians, direct descendants of the Mayan peoples who dominated the Yucatan until the Spanish conquest. Because Belize, formerly known as British Honduras, was until recently part of the United Kingdom, the people of Blue Creek speak fluent English as well as Kekchi, Mayan, and Spanish. They were interested in our work and welcomed us to their village.

Our study began in January 1982. After arriving at Blue Creek and becoming acquainted with our Kekchi hosts, we began to set up mist nets for capturing birds. A 12-year-old Kekchi boy, Juan, agreed to cut net poles for us. With sharpened machete and surgical skill, he converted young cecropia trees into 12-foot poles that he insisted on calling "sticks."

While setting up our first net on our first day in the field, a volunteer suddenly called out "What's this?" He stooped and picked up the fresh carcass of a small snake, the accidental victim of his boot. One glance at the triangular head and bold body pattern told us that it was a pit viper, probably a young fer-de-lance. We forced open the dead serpent's mouth and saw the long hypodermic fangs that deliver venom. As we cut additional net lanes the highly poisonous snake was constantly on our minds, reminding us to watch where we placed our feet.

Despite the encounter with the snake, our eager volunteers (a nurse, a lawyer, a homemaker, a retired naval officer, a veteran bird bander, and three physicians) soon had the nets erected, and the fun of banding birds began. Each captured bird was identified, sexed, aged, checked for parasites, and given a U.S. Fish and Wildlife Service band. That year we captured and marked 62 migrant birds. In January of the next two years, 1983 and 1984, we returned to Blue Creek to band more birds and, we hoped, to recapture birds that we'd banded previously.

The wood thrush that Wayne brought to us in 1983 was just the first of nine species of North American migrants that we recaptured at the same sites—sometimes in the same nets—at which we had banded them the previous winter. We recaptured yellow-bellied flycatchers, gray catbirds, ovenbirds, northern

WILLIAM E. DAVIS, JR.

JOHN KRICHER

Snapshots of a study, left to right: research assistant Melinda Welton holds speckled mourner, a tropical native and "exciting capture"; Blue Creek village, home base for the study; northern royal flycatcher, another tropical native; Earthwatch volunteer photographs olive-backed euphonia held by research assistant Wayne Petersen.

waterthrushes, common yellowthroats, yellow-breasted chats, Kentucky warblers, and hooded warblers. Our three winters of research have clearly demonstrated that these migrant species are as loyal to their wintering sites as they are to their nesting sites. Furthermore, the work of other tropical bird banders confirms our findings. Our search of the ornithological literature has turned up reports of high winter-site fidelity for 49 species of North American migrants.

Why should migrant birds use the same wintering sites each year? The simplest answer is that winter is a difficult time for birds, even in the tropics. Although some ornithologists have regarded the tropics as a "Garden of Eden" for North America's wintering birds, the area contains numerous year-round residents that may compete with migrants for limited food. Thus a wood thrush that "knows" its territory and can reestablish it each winter probably stands a better chance of finding food, surviving competition with its own and other species, and avoiding abundant tropical predators than it would if it moved to a new territory each year.

Some researchers claim that there is little or no evidence of actual competition between migrants and resident species. However, Edwin Willis, a tropical ornithologist, has found that native antbirds seem to prevent migrant thrushes from gaining access to insects flushed out by advancing swarms of army ants. It seems likely that other direct competition occurs as well. Our study area in Belize contains 31 migrant and 126 resident species, so the potential for competition is great. Furthermore, during the winter Central America is very crowded with birds because of its small land area—approximately one-eighth that of North America. Each fall huge numbers of migrant birds descend on this area, each seeking to establish a winter territory. Considering the limited space and food, those birds that return to the same site each year may have the greatest chances for survival.

Ironically, the habit of reusing wintering sites could be the migrants' downfall, given the rate at which humans are destroying tropical habitat. Belize provides a typical example. This impoverished country is attempting to modernize; modern farming technology is challenging traditional, native farming practices, and tall rain forests are being cleared for pastures and agriculture. How will birds fare in the face of such habitat changes?

To investigate this question, we examined the bird communities in different types of habitats, from recently cleared areas to mature rain forest. We wanted to learn which bird species lived in each habitat. Were migrants wintering only in the mature rain forest or were they using disturbed sites as well? For example, did species such as common yellowthroats winter in the forest or in the tropical equivalent of their brushy nesting grounds? And did forest-nesting species such as wood thrushes also seek forests in winter?

Our study area contained a variety of habitats in different stages of growth. The variety results mainly from the traditional slash-and-burn farming practices of the local Indians. Farmers clear small areas by machete, then burn the felled vegetation to release stored minerals into the upper soil layers. After planting the cleared areas for a few years the farmers abandon the sites, allowing them to grow back to forest while new areas are cleared. Such small-scale slash-and-burn agriculture creates different types of bird habitats, from abandoned brushy areas to forests at various stages of regrowth.

We studied three different habitats. The first, a mature rain forest, contained tall, well-buttressed trees, most of which were heavily burdened with bromeliads, orchids, and various cacti. Many species of vines and lianas climbed the trunks or hung limply from the canopy 35 to 40 yards above ground.

The other two habitats were both areas that had been disturbed by the Indians. One was a recently abandoned area contiguous with the palm-thatched wooden houses of the settlement. Densely overgrown, the site was so thick that we needed machetes to cut paths through it. Here and there, spindly cecropia trees with huge palmate leaves emerged from the thick brush. The other disturbed area was a young jungle forest that we named "Pig Alley" because domestic swine and native collared peccaries, or javelina, often rooted at the buttressed bases of its trees.

Our Earthwatch volunteers set nets in each study site and took turns collecting and banding the birds captured at each one. Lacking a field station near Pig Alley, we brought a portable table and set up our

JOHN KRICHER (4)

banding operation next to the gravel road leading from Blue Creek village. Heavy rains fell often, providing generous quantities of thick mud as we slogged from net to net, closing each one as quickly as possible so that birds would not be captured; in the rain they might die of exposure. When the rains subsided, steamy heat fogged our eyeglasses as we reopened nets and dreamed of ice-cold sodas.

Our three sites were well separated, and exciting captures such as a pair of bare-crowned antbirds, a speckled mourner, or a blue-crowned motmot had to be carried from site to site so that all of us could see and photograph these fancy tropical species. Usually the most youthful volunteer in each group drew the job of "bird runner."

We learned that there were distinct differences in both the resident and migrant bird communities in the three habitats. We found the greatest number of species in the mature rain forest, and some species were found only there. These included the wood thrush, whose call notes punctuated the rain forest dawn chorus, and the black-throated green warbler and American redstart, which joined mixed flocks of honeycreepers and euphonias foraging in the forest canopy.

The two disturbed areas both contained fewer species than the mature rain forest, but each contained some species not found elsewhere. Among resident birds, blue buntings and blue-black grosbeaks were netted only in the recently abandoned site, whereas bare-crowned antbirds were netted only in the young jungle. And among migrants, gray catbirds, yellow-breasted chats, and common yellowthroats were found only in the recently abandoned area, whereas Kentucky and hooded warblers skulked in the young jungle's dense, shaded undergrowth. These migrants were living in habitats similar to those which they occupy on their breeding grounds.

It soon became clear to us that disturbance creates brushy and young forest habitats required by certain bird species, both resident and migrant. Such disturbance results not only from slash-and-burn farming but also from windstorms, lightning, landslides, treefalls, and other natural events. Together the disturbances maintain a mosaic of habitats—from grassy fields to mature rain forests—which ensures the maintenance of a large number of bird species.

But modern agricultural practices and pasture clearing are altering the traditional landscape, with potentially serious implications for migrant birds. Species that winter in mature rain forests will probably be affected most as more and more forests are cut. A wood thrush that breeds in New York, for example, might arrive faithfully on its winter territory in Central America only to find that its forest home has become a cattle pasture. The bird would then have to move to a new forest, where it might have a difficult time finding food or be more vulnerable to predation. On the other hand, populations of birds that winter in brushy areas, such as the chestnut-sided warbler, might increase as large areas of forest are cleared.

Exactly what the future holds for birds that live in the tropics, whether year round or as winter residents, remains unclear. Our understanding of bird ecology in the tropics is still poor, and basic questions remain unanswered. Though we have learned that certain migrant species have high winter-site fidelity, we have little idea how such loyalty is developed or maintained. Migrant birds do not sing on their wintering grounds. How do they establish their winter territories? Are these territories defended against their own and other species? If so, how? What actually happens to a migrant that returns to the tropics and finds that the habitat surrounding its former territory has been changed? What is the chance that the bird will find a new territory? To what degree do resident species influence the distribution and abundance of migrants?

Unfortunately, efforts to answer these questions are racing against uncontrolled exploitation of tropical ecosystems. We hope that studies such as ours will convince people who make land-use decisions that the course of change in the tropics should be charted with an eye toward conservation of diverse habitats. □

John C. Kricher is professor and chair of the Biology Department at Wheaton College, Norton, Massachusetts, and president of the Association of Field Ornithologists. His book, *Exploring the American Tropics*, will be published by Prentice Hall Press. William E. Davis, Jr., is professor of physical and biological sciences at the College of Basic Studies of Boston University, Boston, Massachusetts, and vice-president of the Association of Field Ornithologists.

Further reading

Keast, Allen, and Eugene S. Morton (eds.). *Migrant Birds in the Neotropics: Ecology, Behavior, Distribution, and Conservation.* Smithsonian Institution Press, Washington, D.C. 1980.

Killdeers

One summer day, while sitting at the edge of an open field, we spotted a killdeer crouched in a small hollow. Because killdeers nest on the ground, we surmised that the bird was on its nest. But as we stood up to approach the nest, the bird also got up, ran 15 feet to the left, and crouched into another hollow.

Now the bird looked as if it were settling down over eggs. It *must* be on its nest now, we thought. But when the killdeer shifted locations three more times in the next five minutes, we knew we were being led astray.

This *run-and-crouch* behavior is one of the killdeer's methods of confusing predators that are looking for its nest. Predators are a serious threat to killdeers, because there is no concealing vegetation in the fields where killdeers nest, and the parents' movements in and out of the nesting area are readily visible. But after a predator has followed a killdeer from hollow to hollow and come up empty-mouthed each time, it is likely to look elsewhere for an easier meal.

Behaviors are not the only means killdeers have of concealing their nesting locations. No nesting materials are gathered; instead, the nest is merely a shallow scrape in the gravelly earth. In addition, the eggs are mottled with grays and browns, making them look like stones. So even if a predator came near a nest it probably would have a hard time spotting it. In fact, when looking for a killdeer nest, you risk stepping on it before you see it.

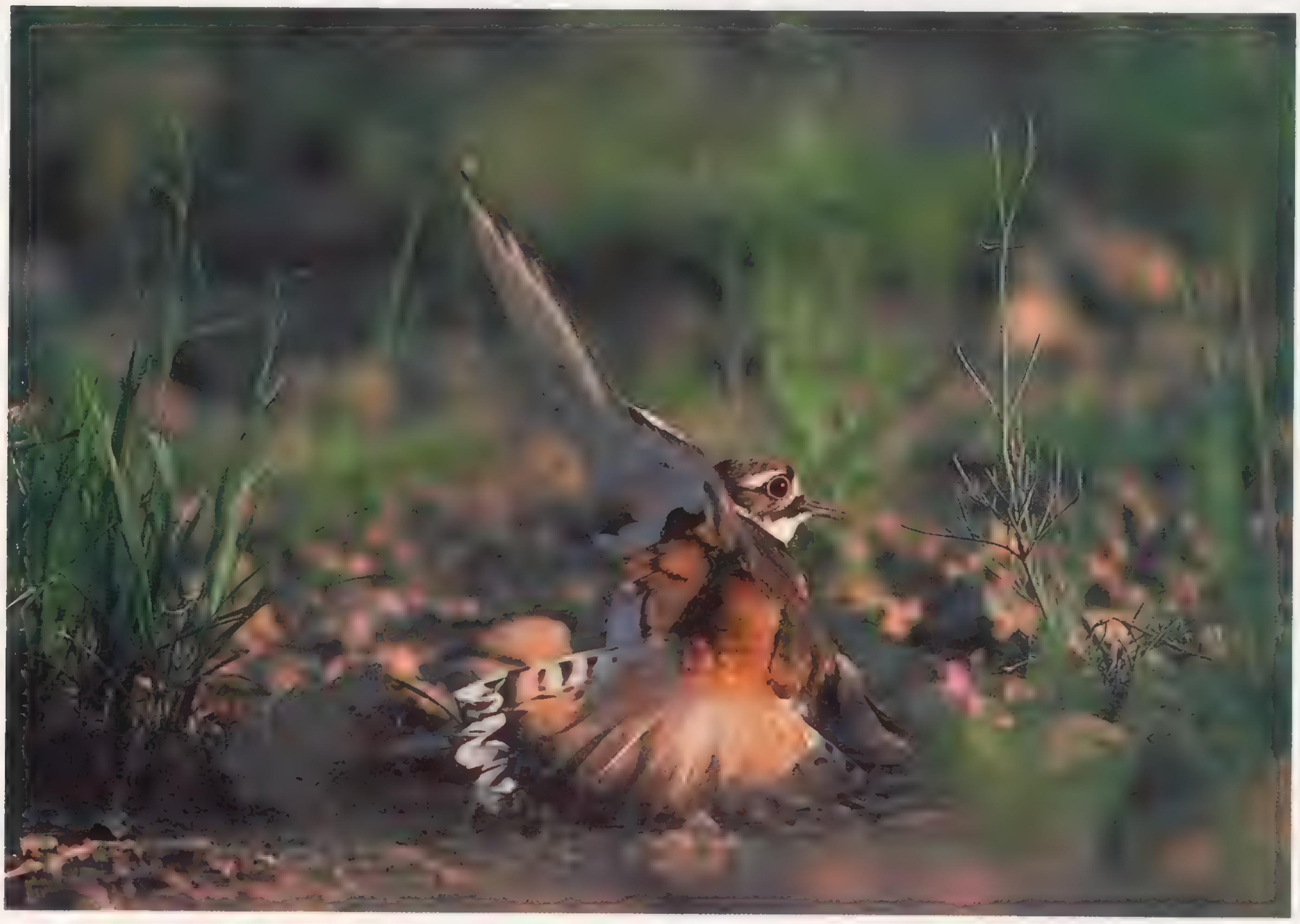
Eventually we did find the nest we were seeking. We withdrew from the nesting area to a distance at which the bird and its mate were no longer concerned with us—about 100 yards—and watched them for several moments. One killdeer remained crouched in the same spot for 15 minutes, then stood up and poked its bill toward the ground. We suspected that the bird was turning its eggs to keep them evenly warmed during incubation. When the bird flew off we carefully approached the site, found a nest with four eggs, and marked it with a small stick.

The next day we returned to the area and witnessed another deceptive behavior. When we were about 50 feet from the nest the incubating bird stood up, ran about 5 feet, then launched into a full-scale display. With its rufous tail spread and one wing held out to the side, the bird flopped haltingly away from the nest, loudly calling *kildeah-kildeah-kildeah*. The display was mesmerizing and distressing; the bird looked and sounded as if it were seriously injured. We backed away, and within a minute the bird had stopped the display, flown quietly back to the nest, and resumed incubating.

The *broken-wing display* we had witnessed is given by killdeers to attract the attention of predators and lead them away from the nest. Popular lore claims that the bird is feigning a broken wing. In fact this distraction display is not a conscious act of mimicry but an instinctive action that has evolved over thousands of years to resemble a bird with an injured wing.

Predators are not the only threats killdeers face. One day a horse was grazing in the nesting field. Of course a horse would not prey on the young birds, but it could step on the nest. When the horse approached the nest, one of the killdeers flew directly at its face, veering away at the last moment. This action prompted the horse to move to another area, farther from the nest.

Donald and Lillian Stokes are authors of the Stokes Nature Guides which include *A Guide to Bird Behavior*, Vols. I and II.


WYMAN P. MEINZER

When a predator approaches a killdeer nest, the bird often gives a *broken-wing display* that lures the intruder away from the nesting area.

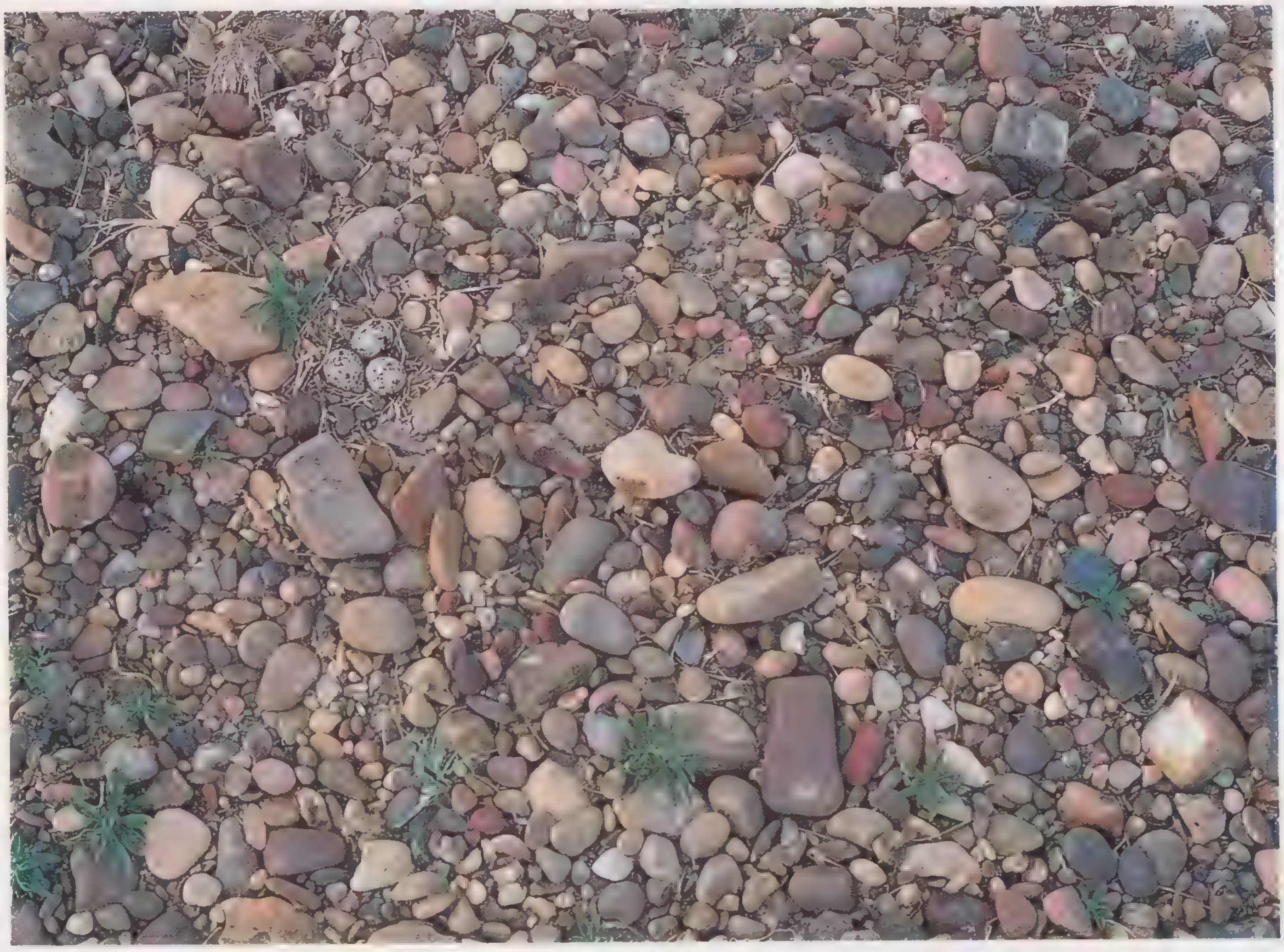
On another day later in the killdeers' nesting cycle, we noticed several cars stopped at an intersection near the nesting field. Joining them, we saw the parent killdeers leading their young across the road. The four fledglings were running in circles in the road while one parent performed distraction displays and the other flew at the cars. The parents seemed unable to tell exactly what danger the cars posed and were trying both types of protective behavior. To alleviate the situation we picked up the fledglings and placed them across the road so that their parents could lead them into the fields beyond.

When looking for a killdeer nest, you risk stepping on it before you see it.

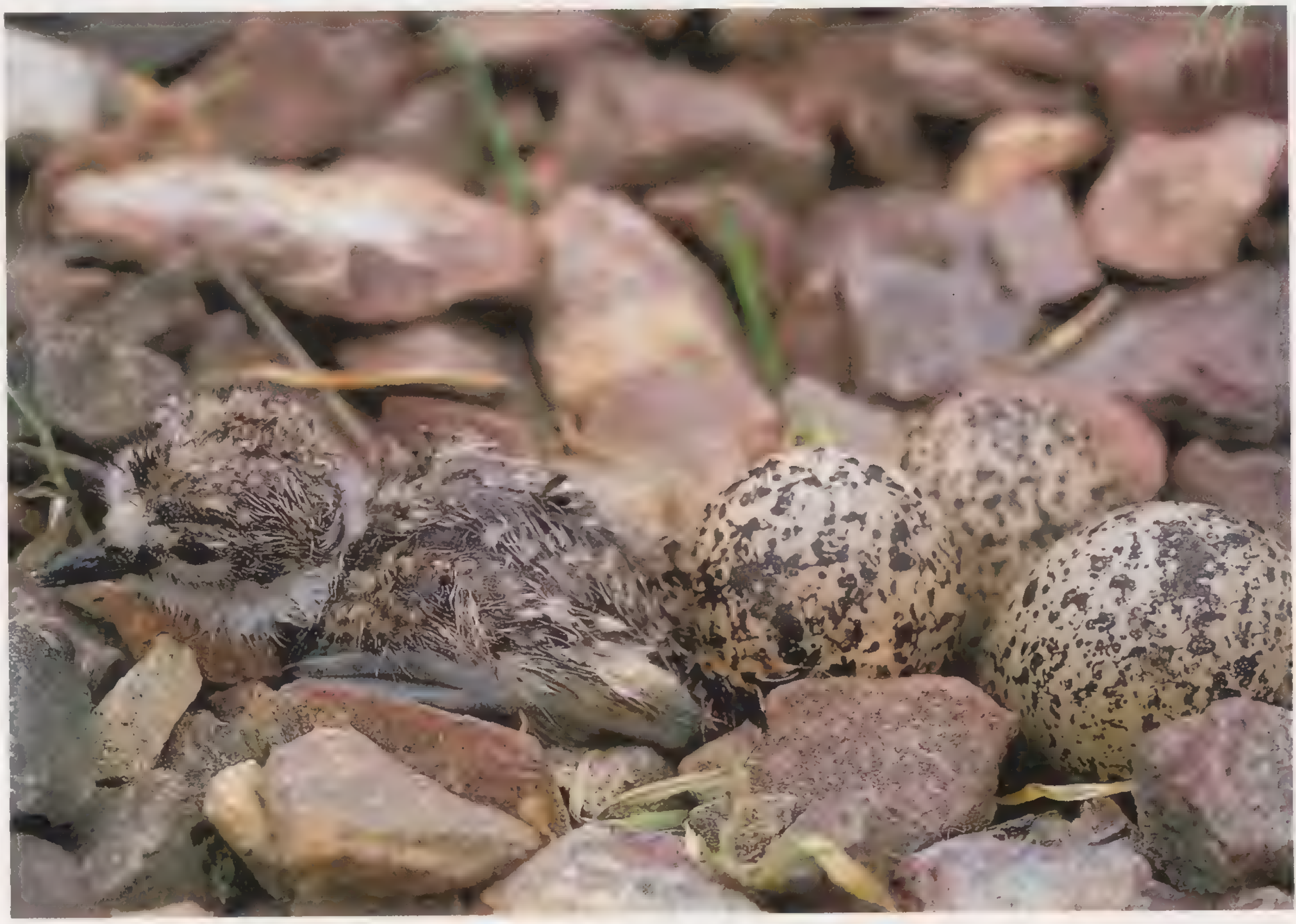
Throughout our season of watching killdeers, we witnessed various adaptations that the birds have evolved to compensate for the danger inherent in their wide-open nesting habitat. They built inconspicuous nests, laid cryptically colored eggs, used the run-and-crouch display to disguise the nesting location, used a distraction display to lure away predators, and attacked large grazers directly.

People often ask us, "How can birds that nest on the ground survive?" Killdeers clearly are well adapted for ground nesting—except perhaps when human technology intervenes.

—Donald & Lillian Stokes



TOM AND PAT LEESON



STEPHEN J. KRASEMANN (PHOTO RESEARCHERS, INC.)

A killdeer nest (top) is hard to find. The eggs are usually laid on the ground; mottled with grays and browns, they resemble stones. Below: Young killdeers can leave the nest almost as soon as they hatch.

Sudden Stops

"CAUTION: Beware of Sudden Stops. Birders Aboard!" reads a hot new addition to the bumper-sticker market. There's good reason: given the way bird watching is conducted in the United States today, a car is only slightly less essential than binoculars.

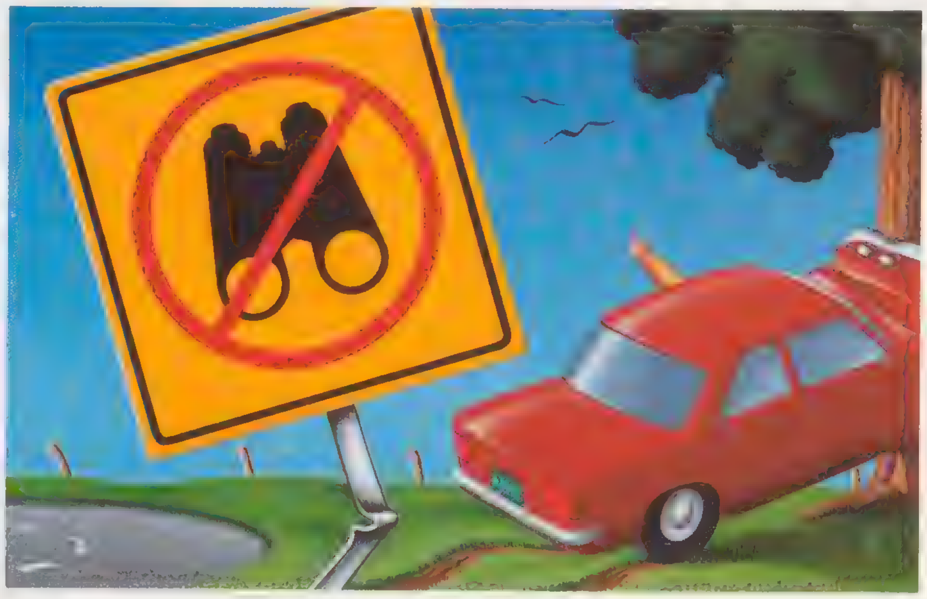
Read the local bird club bulletin. "Our annual trip to the shore will be on the first weekend in the month. Meet at the nature center parking lot. *Car caravan* will leave at . . . making stops at . . . returning by. . . . "

Pick up a copy of the *American Birds* Christmas Bird Count issue. Read the Count statistics. Try to find a Count where miles walked exceeded miles driven. There aren't many.

One of the membership perks of the American Birding Association is an Avis discount card. The Cornell Laboratory of Ornithology issues new members a spiffy window decal. An effective way to control access to sensitive natural areas is to limit parking spaces.

My point is not to throw stones; the interweaving of birding and driving was a cultural inevitability. The internal combustion engine has polluted every other facet of American life. Why should birding have remained uncontaminated?

Once upon a time, during one of those metaphysical discussions that often spring from the third (or fourth) pitcher, Clay Sutton (Cape May's hawk-watching laureate) and I mapped out a field trial. The focus was cars for birders. We reasoned that by taking part-time jobs as parking-lot attendants in Atlantic City, we could get our hands on some of the finest road machines on earth. Brigantine National Wildlife Refuge, only 10 minutes away (by car), would offer a beautiful eight-mile test track in addition to some exceptional birding.


STEVE CARVER

Our trial would take a hard look at such features as visibility through the windshield, ground clearance, cruising range, and whether coffee cups sat on the dashboard. Cars would lose points if throwing the driver's seat forward detonated the horn, if the curve of the windshield distorted binocular images, if tripod legs had to be retracted to fit into the trunk. But one test would supercede all, highway birding's hottest issue: braking distance.

Speaking of brakes, it is a rare birder whose repertoire of birding adventures doesn't include one or two under the file marked "automotive mishaps I have survived." Fortunately, most accidents are in the fender-bender class. But even major automotive misadventures need not put the kibosh on a good day's birding. On one outing, an exceptional field-trip leader had his brand-new subcompact totaled by a nonbirding driver who failed to observe a stop sign and the lead car of a 20-vehicle caravan. No one was injured, and after the intersection had been cleared and all legal formalities honored, our leader accepted a seat in another car and finished the trip.

Accidents while birding are probably inevitable. Good birding often demands driving under horrible conditions. Several years ago, I was on an annual trip to Newburyport, Massachusetts, with a venerable assemblage of New Jersey's finest birders. Overnight, a massive cold front dropped temperatures from 60 degrees Fahrenheit to minus 10 and dumped two inches of rain that quickly became over two inches of ice.

As we gingerly navigated one of the bobsled runs that passed for a road on Plum Island National Wildlife Refuge, the top of a snowdrift swiveled its head to reveal a pair of yellow eyes. A mild application of brakes sent us into a series of 360-degree spins—to everyone's annoyance but nobody's concern. Flanked by four-foot walls of snow, we certainly weren't going to careen off the road.

So, while the car skipped and bounced along merrily, all occupants (including the driver) strained to keep the bird in focus. Friction and gravity finally brought us to a halt, and we examined the trip's first snowy owl at leisure.

One of the problems facing birders is that with one eye on telephone wires, fenceposts, and the sky, only one eye remains free to perceive an upcoming bad memory. A hawk-watching friend sheepishly relates how he inadvertently landed his father's car in an Amish cornfield—the price of seeing his first rough-legged hawk. Another friend likes to recall the time when, puzzled by an identification, he was flipping through the field guide resting on the passenger's seat. He looked up in time to identify the trunk of a sweet gum. Pete was fine. The tree was fine. The Delta 88 was totaled.

Perhaps birding while driving is unwise. One of New Jersey's best field birders confides that his considerable skill at 55-mile-per-hour birding makes his nonbirding wife anxious. He attributes her anxiety to a lack of faith in his powers of peripheral vision. "She just doesn't believe," he complains, "that anyone can watch through the side window for birds and still drive by looking out the corners of their eyes." Hmmmm.

Unwise or not, birding and driving have become inseparable. I pass no judgment; I have no desire to start an anti-automotive revolution. Birders who want to see new birds have to get to new places. But I dread the day that some insurance company runs a correlation between "birding as an avocation" and "rear-end collisions." My rates are high enough already. **—Pete Dunne**

Pete Dunne is Natural History Information Director of the New Jersey Audubon Society and *The Living Bird Quarterly's* newest Contributing Editor. His recent book, "Tales of a Low-Rent Birder," was published by Rutgers University Press. Watch for "The Catbird Seat" in future issues of *The Quarterly.*

GULLS
a guide to identification
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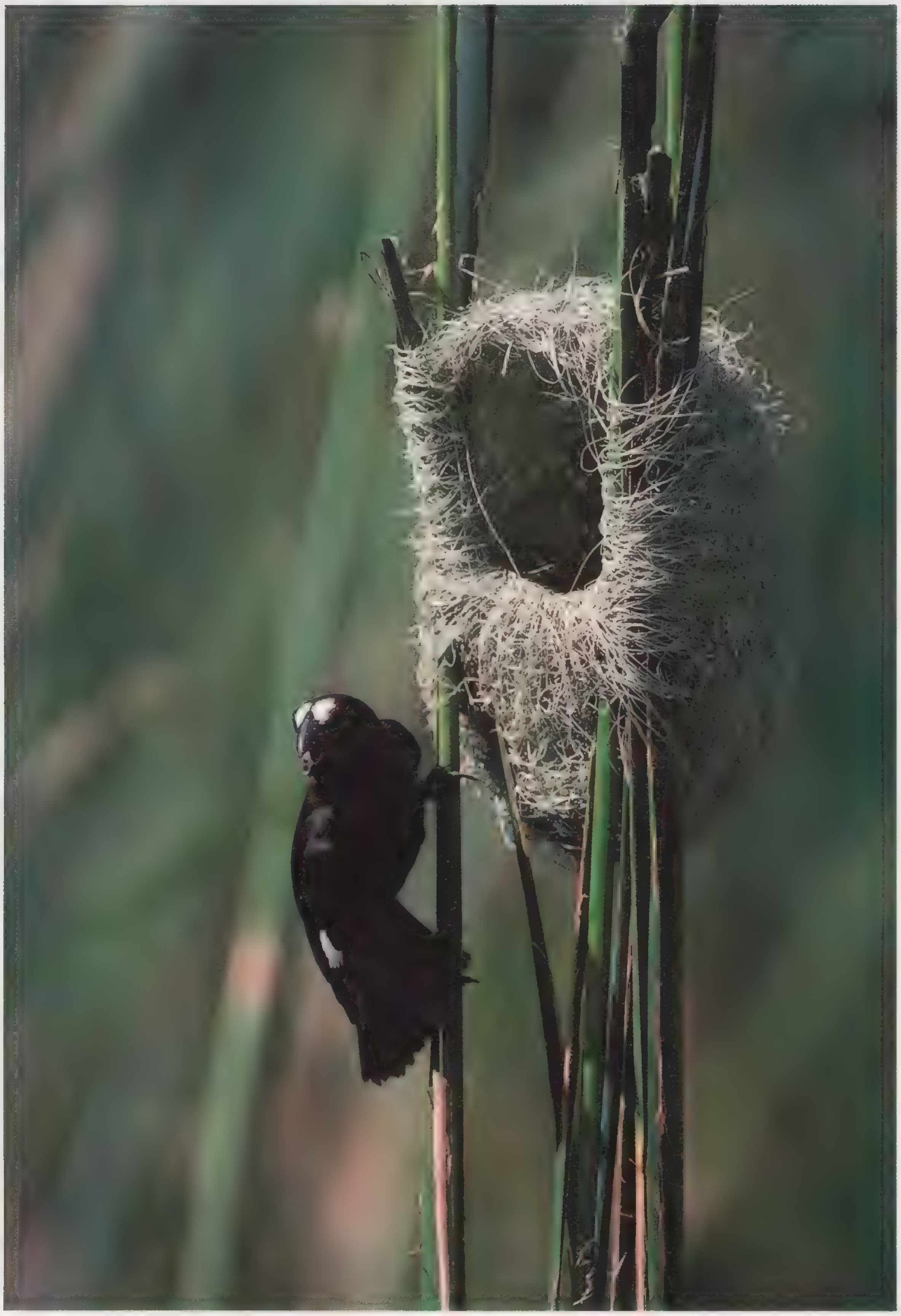

THE LIVING BIRD

Quarterly

Autumn 1987

30th ANNIVERSARY ISSUE

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Cornell Laboratory of Ornithology Autumn 1987 Vol. 6 No. 4

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4 159 SAPSUCKER WOODS RD.

5 BIRDNOTES

6 A BIRDER'S NOTEBOOK *by Michael Harwood*

Peripatetic Harwood dawdles and plods through a skeletonized landscape.

8 SPRING THUNDER IN SAPSUCKER WOODS
by Arthur A. Allen

What Laboratory of Ornithology anniversary would be complete without a word from one of our illustrious founders? In this vintage Allen piece, Doc takes us into Sapsucker Woods on the day he and his equipment-laden colleagues captured for the first time the thunder of a drumming grouse.

12 SMALL WORLD *by Thomas S. Litwin*

On Long Island's south shore, bird species after species is being squeezed out by the proliferation of subdivisions and shopping malls. This world—is it big enough for both people and birds? Laboratory biologists at our Seatuck Research Program are determined to find out.

20 DATA THAT COUNT *by Gregory S. Butcher*

To some they are just a bunch of numbers, but to our researchers in the Bird Population Studies program, Christmas Bird Counts are a wealth of information about the ebb and flow of bird populations. A case in point: recent findings on the gradual decline of the black duck.

25 FOCUS

26 STRANGE WORLD *by Katy Payne*

There's more to the Ornithology Lab than birds. Researcher Katy Payne describes her entry into the unheard world of elephant communication and discusses her conviction that the Library of Natural Sounds contains a mother lode of knowledge about the language of nonhuman creatures.

32 WATCHING *by Donald & Lillian Stokes*

The Stokes's didn't realize it at the time, but the explosive sound—*skwaGOCK whrrrrrr skwaGOCK whrrrrrr*—that awakened them one April morning signaled the beginning of a fascinating year of pheasant watching.

34 THE CATBIRD SEAT *by Pete Dunne*

Field Trip Leader Dunne identifies the real reason why so many novice bird watchers cannot tell a chipping sparrow from the aurora borealis.

p. 8 A Different Drummer

Front cover: This issue of *The Living Bird Quarterly* features the Cornell Laboratory of Ornithology as it celebrates the 30th anniversary of the dedication of its home, the Lyman K. Stuart Observatory. Rainbow illuminates an American kestrel by Rita Summers, Colorado Nature Photographic Studio.
Back cover: Outside—Doc Allen, one of the Lab's founders, is flanked by his wife, Elsa, and famous bird artist, Roger Tory Peterson, as they bird in Montezuma National Wildlife Refuge, New York, in May 1951. Photo from Lab of Ornithology collection. Inside—Photo by C. C. Lockwood.

"Oh, Gee, Bird Songs"

I enjoyed reading the excerpt from Jack Connor's forthcoming book, *Good Birding*, in the spring 1987 issue.

I learned to recognize many bird songs under Doc Allen's tutelage nearly 50 years ago. His use of mnemonics was inspired and humorous. When I escorted him and his wife, Elsa, along the north shore of the Gulf of St. Lawrence in 1946, he devised this mnemonic phrase for the white-crowned sparrow: "Oh, gee, it was the whisk-whiskey." To which the fox sparrow replies: "Well then, my dear, why did you take it?"

Another way of learning bird songs is by the method of onomatopoeia, as many birds are named after the sounds of their calls or songs. In North America there are 24—loon, chachalaca, chukar, bobwhite, sora, killdeer, godwit, curlew, willet, snipe, murre, chuck-will's-widow, whip-poor-will, poor-will, flicker, kiskadee, phoebe, (wood) peewee, (blue) jay, chickadee, veery, (water) pipit, bobolink, and towhee.

Oliver H. Hewitt
Charlotte Harbor, Florida

Dreaming Ornithophile

My first issue of *TLBQ* (spring 1987) arrived today. I am amazed how several of the articles relate directly to my life as an ornithophile.

Michael Harwood's "Dreaming about Birds" was fabulous. I dream about birds several times a month. In one recent dream, a red-whiskered bulbul, a bird I have never seen, appeared outside my office window; I became so excited that I woke up. In another dream some wood storks were roosting outside my parents' house. They tapped at the windows, wanting to come in, and when I went out and sat on the back porch one bird placed its head on my lap! And during a dream visit to Corkscrew Swamp in Florida, a pileated woodpecker was magically transformed into an ivory-billed woodpecker.

Jack Connor's "Quick Three Beers" was encouraging. My husband and I have been trying to learn bird songs, and this year we learned several, including that of the prairie warbler. We actually watched the incessant *zeeng, zeeng, zeeng, zeeng, zeeng*! come out of one's mouth. Now we hear prairie warblers everywhere, and I'm happy knowing that the woods are sprinkled with these yellow beauties.

My new membership in the Lab has brought me a great deal of satisfaction. I have been birding all my life but never considered my ornithological bent a "calling" until recently. Now, I hope that someday, in some small way, I'll be able to join folks at the Lab in your work, and give something of myself to the birds that have given me so many happy hours.

Until then, I'll keep on studying, looking, and listening—and enjoying *The Living Bird Quarterly*.

Denise M. Erickson
Marlton, New Jersey

Strange but True

I'm a student in the Lab's home study course in bird biology. I live near a small woodlot and see many interesting bird behaviors, but one occurred a few weeks ago I'll bet is unique.

Outside my kitchen window is a pussy willow. For several days house sparrows had been carrying on spirited chases in it. I'd often see a female flit from branch to branch with a male in pursuit, his wings spread and tail fanned. Then he'd be rebuffed by the aggressive female.

One morning I saw a female perched on a branch. In her beak, dangling in midair, was a hapless male who apparently had ventured too close and had been grabbed by the cheek! He did not struggle and she showed little inclination to release him.

I was so shocked that I raced outside, but the birds flew off. Have you ever heard of such behavior?

Alice Honea
Taylor, Michigan

No, we haven't. Have any of our readers?

FROM THE DIRECTOR

This year marks a milestone for the Laboratory of Ornithology. Our home—the Lyman K. Stuart Observatory—was 30 years old in May. Anniversaries invite celebrations, and we didn't want this one to go unnoticed. So we decided to honor the occasion with a special anniversary issue of *The Living Bird Quarterly*.

Among the articles is an historical piece by Arthur A. Allen, a Lab founder. In "Spring Thunder in Sapsucker Woods," Doc Allen describes how he and others made the first film and sound record of a ruffed grouse drumming back in 1932. Their innovative work in sound recording gave rise to our Library of Natural Sounds (LNS), which today is the largest collection of natural sounds in the world.

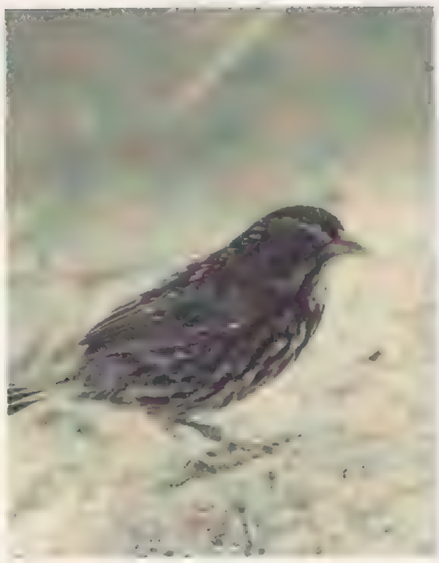
Another article is by Katy Payne, research associate in our new Bioacoustics Research Facility. A wing of LNS, this program was set up to investigate the world of animal sound communication. Katy will tell you more about the program and her work investigating infrasonic communication among elephants.

Bird Population Studies is one of our most exciting endeavors. First known as the Colonial Bird Register and Nest Record Card Program, then as Cooperative Research, the program attempts to untangle the myriad of data on bird populations collected by volunteer observers across the country. One of the biggest volunteer-collected databases results from the National Audubon Society's annual Christmas Bird Counts, and in "Data That Count," Greg Butcher—director of Bird Population Studies—describes how that database can be analyzed to reveal important information about changing bird populations.

The Laboratory also collects bird-population data of its own, especially at our field station at the Seatuck National Wildlife Refuge on Long Island, New York. Seatuck biologists are studying bird populations that are declining because of human development and are working to learn how such birds can live amid subdivisions and shopping centers. The article by Seatuck Research Program Director Tom Litwin describes the smaller and smaller world in which bird species have to fit.

We hope these articles will give you a feeling for what's going on at the Lab 30 years after our official address became 159 Sapsucker Woods Road.

CHARLES WALCOTT, Executive Director



1987 The Walt Disney Company

The last one

The dusky seaside sparrow is now extinct. On June 16 the last surviving individual died of old age in its cage at Disney World in Florida, where it had lived since 1983. The bird was at least 10 years old.

The subspecies originally lived in marshlands along the St. Johns River near Cape Canaveral, Florida. Thousands of dusky seaside sparrows once flourished there, but in recent years the population has been reduced by land development, drainage, highways, and fires that have destroyed the birds' habitat.

Tissue from the last dusky was sent to the University of Georgia, where it was frozen in the hope that some future technology may allow the subspecies to be resurrected through genetic cloning.

The thick-billed parrot, formerly a denizen of southern Arizona and New Mexico, may once again inhabit Arizona if a project jointly conducted by the U.S. Fish and Wildlife Service, the Arizona Game and Fish Department, and the Jersey Wildlife Preservation Trust is successful.

Presently the thick-billed parrot is restricted to the Sierra Madre of Mexico. However, once it flocked in pine forests of southern Arizona and New Mexico. Then in the 1930s it disappeared from those states, a victim of logging and smuggling for the pet trade.

In autumn 1986, about two dozen thick-bills that had been confiscated from bird smugglers were released into Arizona's rugged Chiricahua Mountains, where large stands of pine and oak forest remain. So far the birds have done well, except that they have wandered farther from their release site than project biologists would prefer.

Now, an effort is under way to restrict the birds' wandering. Five captive-born thick-billed parrots have been flown to the United States from their home at the Jersey Zoo in the British Channel Islands. They were released last summer, along with more of their wild-caught cousins. Aviaries were built at the release sites to encourage the captive parrots to remain close to home. Biologists hope that the wild birds will stick around, too, to ensure that a healthy population of this endangered bird will again frequent the mountainous forests of the southwestern United States.

The U.S. Fish and Wildlife Service plans to charge entrance fees at 19 national wildlife refuges beginning in fiscal year 1988. Seventy percent of the fee would pay for acquisition of additional wetlands, the rest for refuge operation. The service expects to collect $8.3 million the first year.

Fees would be a maximum of $3.00 per person or $7.50 per vehicle. However, people with a current federal Duck Stamp, a Golden Eagle Passport, or a Golden Age Passport could enter the refuges without additional charge.

Refuges included in the proposal are: Dungeness (WA), Kilauea Point (HI), McKay Creek (OR), Aransas (TX), Bosque del Apache (NM), Sequoyah (OK), DeSoto (IA), Muscatatuck (IN), Ottawa (OH), Seney (MN), Sherburne (MI), Hobe Sound (FL), Loxahatchee (FL), St. Marks (FL), Chincoteague (VA), Forsythe/Brigantine (NJ), Montezuma (NY), Parker River (MA), and National Bison Range (MT).

AROUND THE LAB

The McGraw-Hill Continuing Education Center has released the McGraw-Hill Wildlife Birding Series, a unique home study course in birding produced in cooperation with the Cornell Laboratory of Ornithology. The course was written by Lab Associate Steve Kress in consultation with the Lab's Education and Information Services program and is aimed primarily at beginning birders.

Eight modules, sent once every four to six weeks, cover bird identification, behavior, migration, habitats, sounds, navigation, and more. Course materials include text, workbooks, color slides, and audio tapes. Cost is $19.95 plus $2.25 shipping and handling per module. For more information, contact: McGraw-Hill Continuing Education Center, 3939 Wisconsin Ave., Washington, D.C. 20016.

The Sapsuckers, the Lab's Big Day birding team, found 166 species of birds in the annual World Series of Birding held in New Jersey last May. That total placed them only 17 out of 25 teams in the final standings but raised more than $20,000 in pledges from Lab members.

Beautiful, limited-edition prints of a ringed kingfisher by the renowned bird artist George Miksch Sutton are available for a $1,000 contribution to the Cornell Laboratory of Ornithology. The prints are signed and numbered by Dr. Sutton and measure 22½" by 27½". To receive one, send your check made payable to the Laboratory of Ornithology to: Sutton Fund, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. The Sutton Fund endows seminars as well as art and colorplates for *The Living Bird Quarterly*.

Bird Investment

Cornell's Laboratory of Ornithology is pleased to offer a different method of financial investing, called a Pooled Life Income Fund, which can benefit you, your family, and the Laboratory. This investment allows you to join others in a gift arrangement that works like a mutual fund. With a minimum of $5,000 you are assured an annual income for the rest of your life. Your share of the fund is transferred to Cornell and the Laboratory after the lifetime of your beneficiaries. In addition, you are allowed a charitable income tax deduction for your gift. To learn more about this investment opportunity, call or write: Scott Sutcliffe, Office of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607) 255-4288.

A Happy Trudge

About the first of October every year I begin to lay plans for the Christmas Bird Counts. If that seems overly forethoughtful of me—after all, the count period is then 10 or 11 weeks away—let me note that my friend the Professor talks eagerly about the next Christmas counts during spring migration.

I like to think about Christmas counts. For one thing, here in New England they signify the ultimate refinement, the distillation, of our natural year. The physical setting is drained of color. The warm tones sink into the brush and meadow scrub, and by December the remnant reds and yellows are an undercoat in the landscape, best seen in dull light on an overcast day. The landscape grows lean, almost skeletonized. Enclosures and enclosed spaces dominate—old stone walls snaking across hilly pastures, dark woods surrounding snow-covered marshes and fields.

Winter can decorate that setting with stunning effects no other season produces. A friend told me about a recent north-country Christmas count that took place directly after a snowstorm. The evergreens, he said, were cloaked in feather-light powder more than a foot thick, and in the evergreens hundreds, maybe thousands, of purple finches fluttered, filling the forest air with drifting plumes of snow. Magical.

I remember one count here in Connecticut when the landscape glittered and tinkled with ice; each branch and twig had been coated by a freezing rain, and all the way to the horizon everything shimmered in the sunlight. When the birders of our count gathered at dusk for a potluck supper and the tallying, we were grinning in exhilaration at the dazzling aura of the day.

The evergreens were cloaked in feather-light powder, and in the evergreens hundreds of purple finches fluttered, filling the forest air with drifting plumes of snow.

So the appearance of the surroundings is an important part of the pleasure I anticipate in Christmas counts. Another part is the job to be done. The accumulated data from some 1,500 counts provide an annual snapshot of where the birds are around the turn of the year. So the counts are opportunities to contribute to knowledge about birds; to my way of thinking that's birding at its best. And my ideal Christmas count—in which I make my most valuable contributions—is one in which I do all my birding on foot, exploring the territory step by step, at a measured pace, instead of racing from one traditional "good spot" to another in a car.

Dawdling and plodding offer considerable rewards in bird discoveries. At three in the morning on one count the Professor, the Artist, and I heard what we thought was the caterwaul of a long-eared owl, which would be a new species for that 15-mile-diameter count circle. We weren't absolutely sure, and we waited for it to call a second time. The Professor, our leader for the day, was willing to give the owl only five more minutes to sound off again, because we had a lot of other owling territory to cover.

The owl didn't start up within the time limit, but neither did the Professor's car. He insists on buying second-hand clunkers, which adds to the adventure of birding with him, and this clunker's battery was suddenly deader than a doornail. He went off, muttering, to find a telephone and a tow truck, and the Artist and I were left to roam the neighborhood for an hour or so. We strolled along the road above a lake, hooting and whistling imitation owl calls and playing owl tapes, and shortly the strange owl yowled again, close by—a nerve-jabbing shriek like the meow of a very loud, very irritated cat. We had never heard that particular vocalization before, in life or on a record, but I had recently heard an imitation of it performed by a veteran birder, who told me that the long-ear's nickname was "cat-owl," after its caterwauling. I was convinced of our yowler's identity, but I would have felt better if we also had seen the bird.

Our exploration took us to the edge of the lake. Now we were aiming most of our effort at saw-whet owls, which would be another new species for the count. All at once we heard owlish bill snapping nearby, and then a medium-sized silhouette glided between us and the snow-covered ice, only a few feet away. After the apparition had disappeared, the Artist exclaimed, "Long-ear!"

"You sure?"

"Yeah. I've been studying museum skins of long-ears for paintings I'm doing. That's what it was."

Having positively confirmed long-ear, we confirmed saw-whet a few minutes later, when from evergreens along the lake, one at last began answering half-an-hour's worth of calls from phony intruders.

I like the dawdling and plodding approach for other reasons, too. Every year, on one of the Christmas counts I take part in, I am responsible for a large chunk of the count circle and have to cover much of it by car, stopping occasionally to sample the bird population near the road. But early in the morning a companion and I walk about a mile along a 400-foot-wide powerline right-of-way through rolling country. The vegetation is mostly old pastures, with plenty of small cedars, sumac, and brambly berry bushes. The track we follow is a rocky roller-coaster—up and down one steep hill after another. At the bottom of each valley is a small brook that trickles from the woods on one edge, through a tunnel of heavy brush, to the woods on the other.

As we walk I frequently stop to whistle screech-owl whinnies or play the screech-owl tape, which brings the chickadees and titmice and cardinals and blue jays into view in various stages of alarm and outrage. Robins, wide-eyed, may appear in the tops of the trees, and bluebirds, timidly singing *tura, tura,* materialize on the powerlines; juncos and tree sparrows chatter in voices like tiny bells as they flit mostly un-

STEVE CARVER

seen through the grass and underbrush.

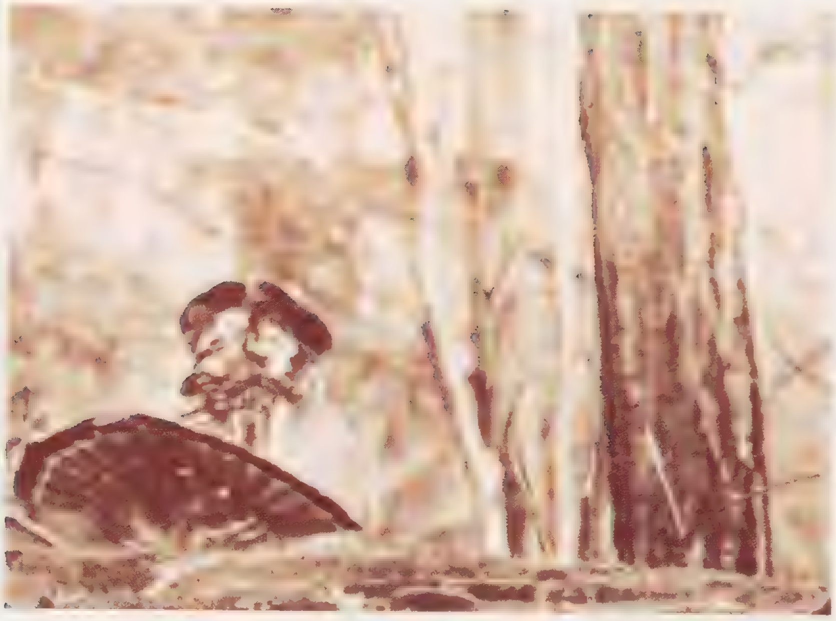
Occasionally we find something unusual—a red-breasted nuthatch, say, or a brown thrasher—but the census we compile there comprises mostly the common species. What's nice about that walk—for me, always the best part of the day—is our uninterrupted linear connection to the landscape and the birds. The tree sparrows in the blackberry bushes and the chickadees hammering on the sumac berries are not targets in some point-to-point auto rally but coplanetarians sharing the same space.

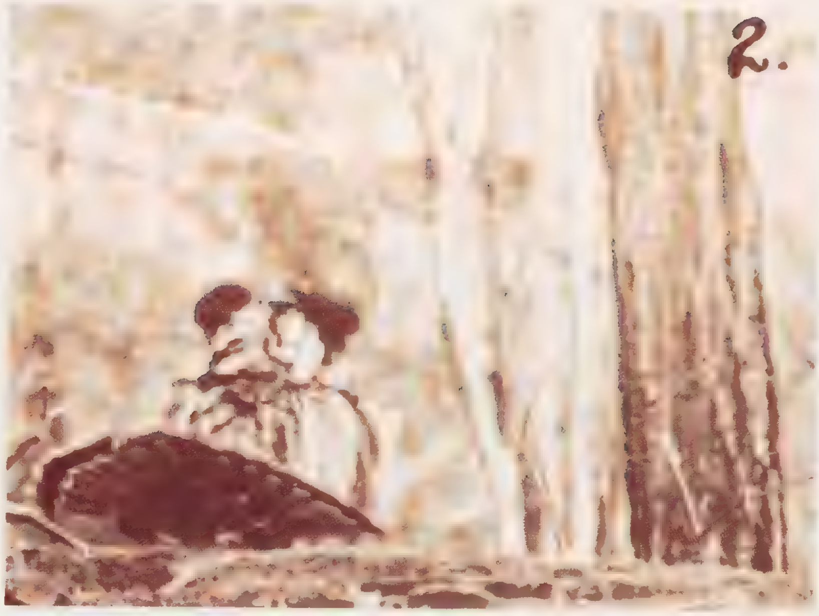
I'd love to keep going on foot the rest of the day and be able to record at the end, "Miles by car—0." That isn't practical, but I and the gang of ringers I collect every year to help with my section of that count spend much more time out of cars than in them. In my mind's eye now I see us—moving parts in the landscape—strung out in a long ragged line across a manured, snowy cornfield as we herd horned larks and snow buntings. The bright sun 45 degrees above the western horizon blazes on the low, wind-sculpted terraces of snow. The pale birds dash among the stubble rows, disappear into little valleys, reappear on the crests—never the same number in view at once until we force the flock to fly.

As we follow the birds in our glasses, trying to count them, they pass across blue sky, then vanish against the gray, sunlit, snowlit woods standing behind the stone wall that borders the field. We pick them up again when, calling softly, they swirl over us. They divide, divide again, seem to scatter, and finally land, running, on the manured snow only a few yards from where they were before.

Our own group now divides and subdivides to hunt for birds along the edges of the woods. Some of us trudge happily toward the sunlit side, some into shadow, connected to each other and the bright day and the woods and the cornfield and the birds and the crusty snow underfoot, drawing sustenance from the connectedness, and exploring it.

—**Michael Harwood**

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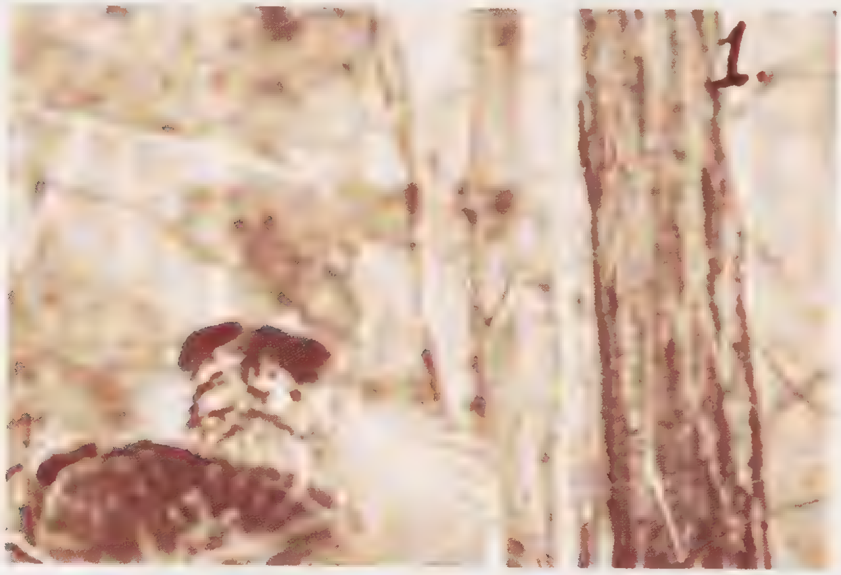
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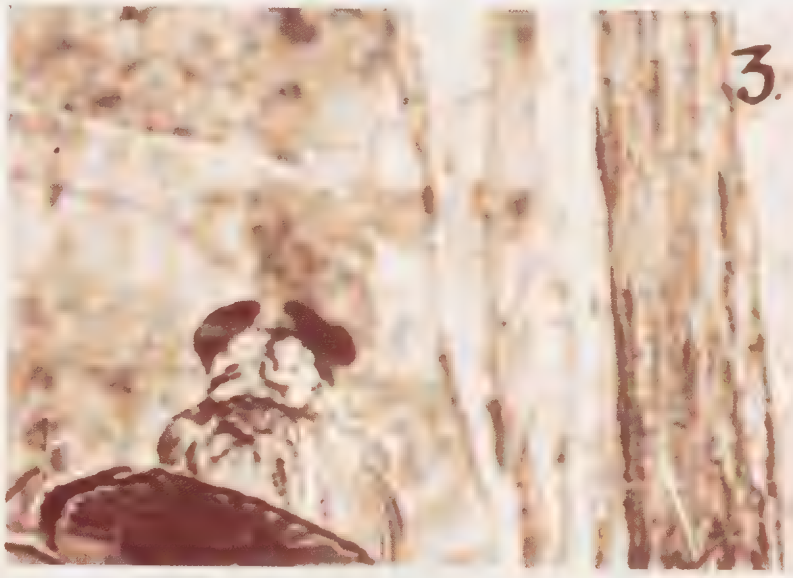
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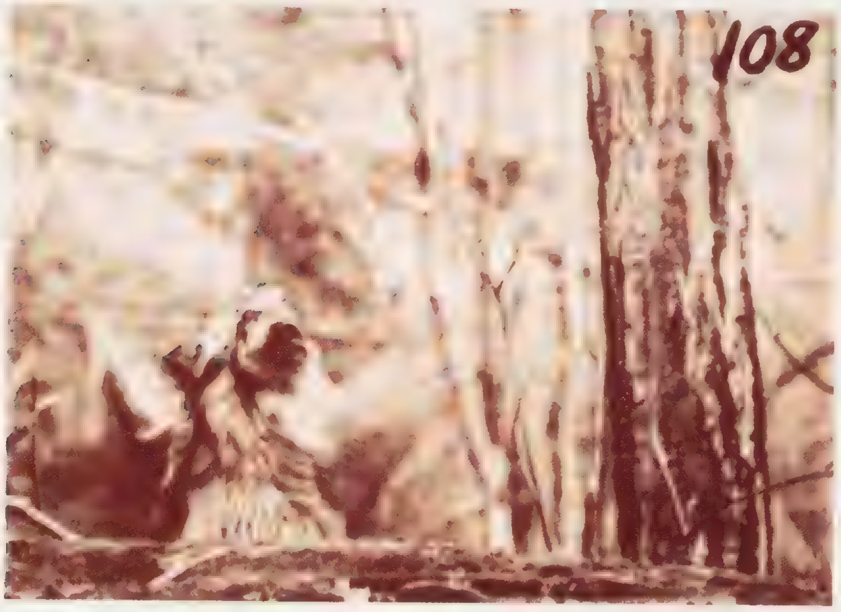
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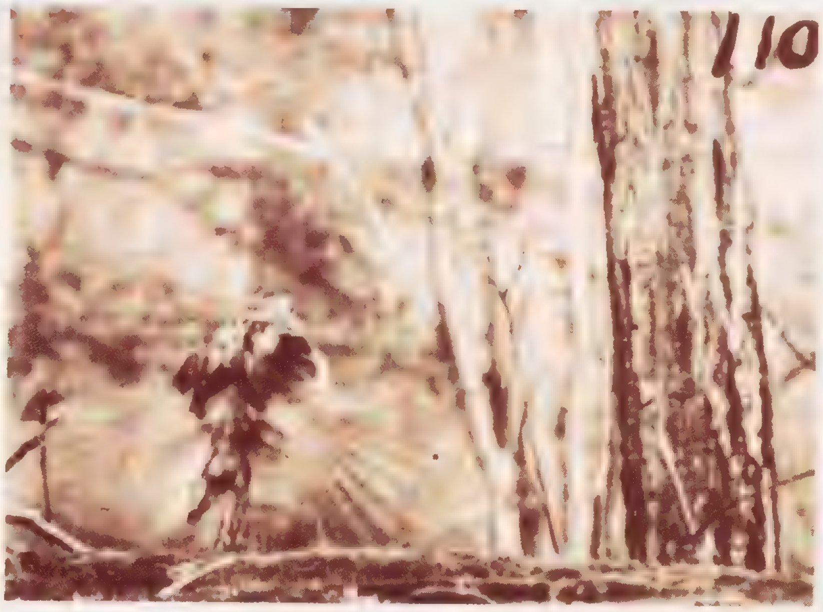
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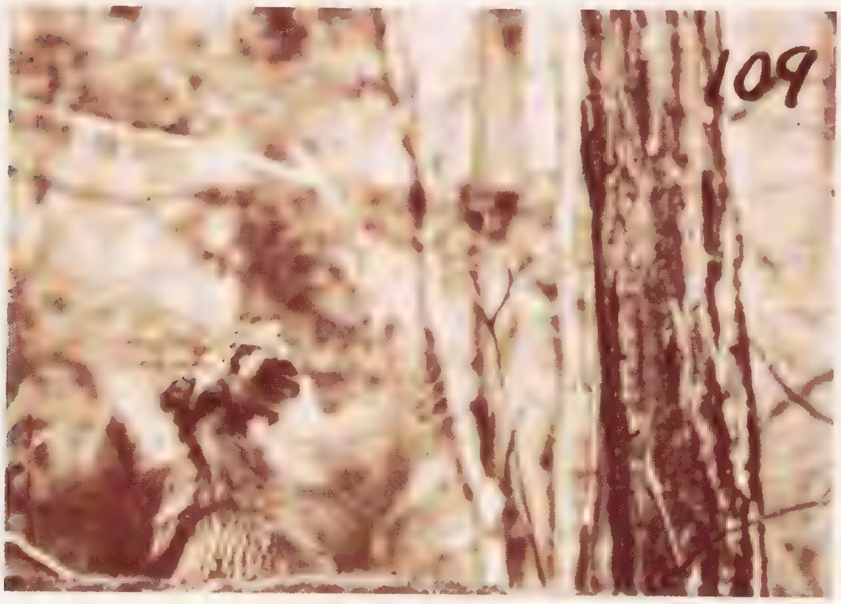
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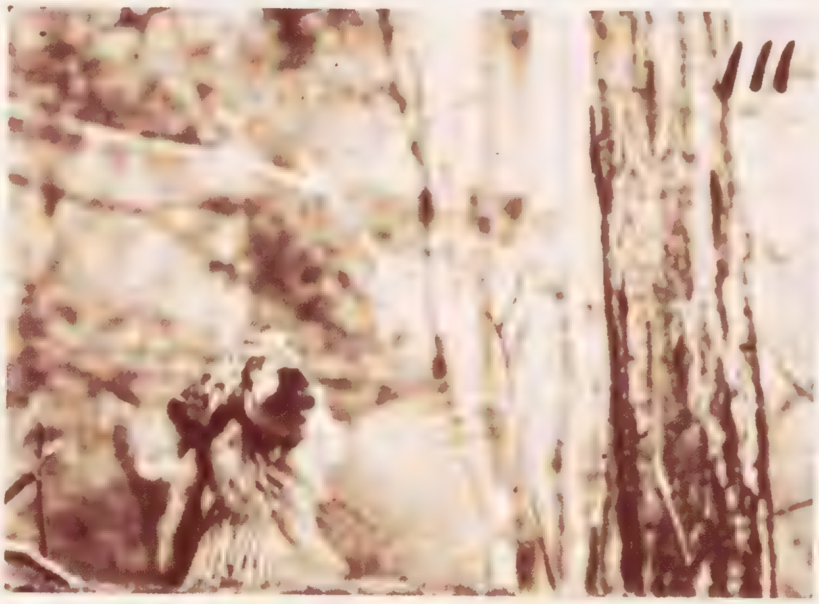
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SPRING THUNDER
IN
SAPSUCKER WOODS

ARTHUR A. ALLEN

It was early May 1932 in Sapsucker Woods. The buds on the beeches had lengthened, the bloodroot and marsh marigolds were in bloom, but the leaves on the maples had not yet unfurled, so that the spring sun still reached the forest floor. The moss on the drumming log was much greener than on our previous visit, and there was evidence of considerable use by the owner. It was obviously time for us to act if we wished to secure a color film of the drummer before the leaves on the maples should throw the log in deep shade. At the same time we hoped to secure a new sound record of the remarkable drumming performance.

Left, triumphant turbulence of air against uplifted curvature of wing creates the muffled thunder of the ruffed grouse. Above, pioneer recordist Peter Paul Kellogg assembles equipment.

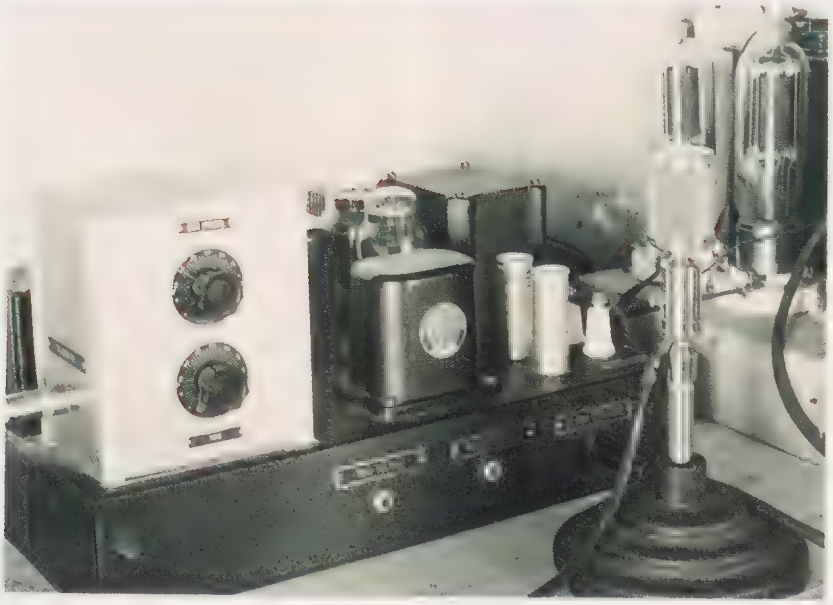
A framework of gas piping, covered with artificial grass mats, served for a blind and blended so well with the young hemlocks that it was not even noticed by the grouse when set up a dozen feet from the log. Even so, we placed it several days in advance of our adventure. The sound truck could be driven within 300 feet of the log and a cable run out to the small saplings that stand guard adjacent to it.

In recording most birds' songs, we use a three-foot parabolic reflector with the microphone hung at the focal point and this has the effect of bringing us about sixty times as close to the bird. But the parabola would be unnecessary in recording the grouse because we could fasten the microphone to a sapling within a couple of feet of the log and feel sure that the bird would come back to exactly the same spot. Moreover, the reflector, while very desirable for recording the high frequencies of ordinary bird song, would be of no value in recording the low frequencies (40 cycles per second) of the grouse drum.

We had learned from past experience that the grouse drums best and most continuously before sunrise and at this time, fortunately, other sounds are at a minimum unless there happens to be a frog pond close by. Accordingly, on the afternoon of May 5, Charles Brand (the son of Albert Brand, who was the original sponsor of our sound recording project) and the author parked the sound truck at the edge of the woods, ran out the cable, fastened the microphone to a small sapling next to the drumming log, covered it with moisture-proof "pajamas" and got everything in readiness for the early morning job. Charlie volunteered to sleep in the truck as guard and technician and I was to waken him when I came by at 4:00 a.m. to get into the blind with my camera. We planned to record the sound in the quietness of the pre-dawn hours, and take the motion pictures after the sun should strike the log about 6:30 or 7:00 a.m.

Everything worked out as planned. Fifteen minutes after I was safely ensconced in the blind, I heard light footfalls on the dried leaves behind me, footfalls and then periods of silence and each time a little closer. Finally the rustle in the leaves passed within three feet of me and a long period of silence ensued. It was too dark to see whether his regal highness had mounted

ARTHUR A. ALLEN



the log or whether he had become suspicious of my presence, so I dared not move, and became increasingly uncomfortable. At last came a muffled thump—just a single blow against the air and then another wait; again I feared I had frightened him, for I was less than a dozen feet away. But soon thump followed thump with increasing rapidity until the final roll completed a performance that is almost unbelievable in its technique.

At a dozen feet distant the bird sounded no louder than it would had I been a hundred yards away, though I could hear the rustle of dead leaves caught in the whirl of the air currents set up by his rapidly moving wings. Audubon believed that the grouse pounded the log with its wing, but surely he could not have watched the performance at close range. Other observers have explained that the wings strike behind the bird's back, as they do in the courtship flight of certain pigeons, or that the bird pounds his sides like a rooster, but they, too, could not have had the opportunity that was afforded me that May morning in Sapsucker Woods and on other occasions as well.

As the sun gradually appeared above the horizon and darkness gave way to pale dawn and finally golden sunlight, I had ample opportunity to study the movement of the bird's wings, while waiting for the light to become sufficient for photography. Every five minutes the bird roused himself from apparent lethargy and gave a feeble stroke against the air with his wings. This, apparently, righted him and put him ready for action, for as stroke followed stroke and the muffled thumps sailed out across the woodland with increasing rapidity, he not only stood very erect, but the concussions of the air forced him backward and downward against his tail, which was flattened on the log. So much so, indeed, that at the completion of the roll, the spring in his tail tipped him forward. It was perfectly evident that his curved wings, with a forward and upward stroke, hit nothing but air and that they struck with such force as to produce the muffled drum, the spring thunder—so familiar to those who follow the trout stream, or tramp the woods in spring.

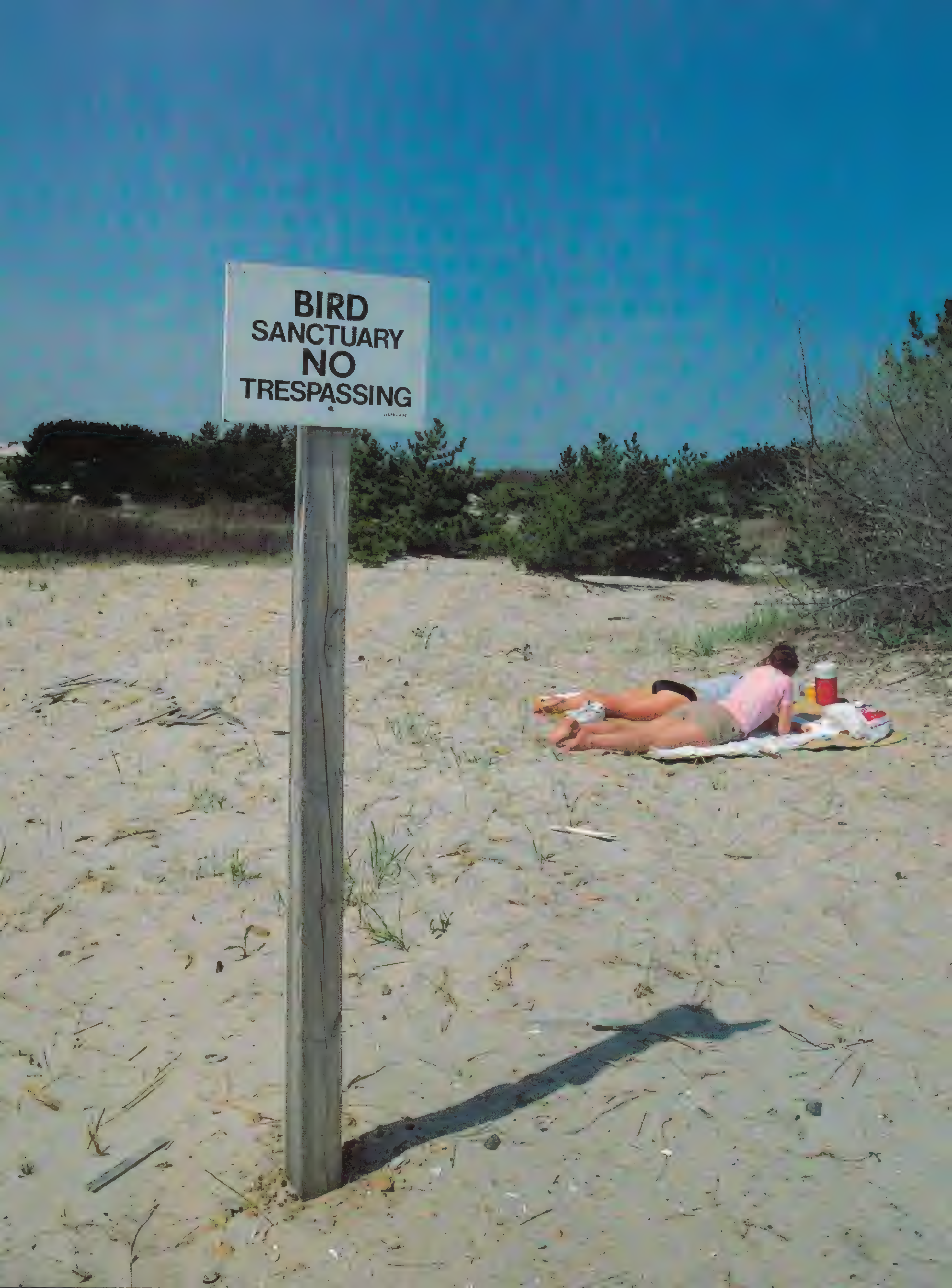
Once during my early morning vigil I heard the distant hoot of a horned owl, and I feared for the moment that he had heard my drummer and might be coming on silent wings to wreak destruction upon my bird and upon all our plans. But the owl never came any closer and I was led to wonder what, if any, provision of nature can give protection to a defenseless grouse that insists on announcing its presence during the dead of night well within the hunting territory of its arch enemy. My answer came a couple of years later when we put a graduate student, Ernest Edwards, to work measuring the hearing range of certain birds—among them the horned owl. Perhaps we should have guessed it—but, anyway, the study showed that the lower hearing range of the night prowler cuts off at 70 cycles per second—just 30 cycles above the pitch of the ruffed grouse drum—so that no matter how close he passes to the drumming log, he never hears the "spring thunder."

Top left, student M. Peter Keane mans the controls in the pre-dawn stillness of the woods. Below left, heavy, bulky, pre-transistor equipment recorded poor quality but groundbreaking first sounds. Near left, Doc Allen photographs another Sapsucker Woods resident, a frog.

As the sun rose that May morning and our drummer continued his springtime challenge to the few other grouse that inhabit Sapsucker Woods, we preserved his antics in Kodachrome. On another morning, by placing a stuffed female near his log, we caught his full courtship display with tail and ruffs erected. Shaking his head from side to side, he caused his Elizabethan frill to rotate and shot iridescent arrows of light towards his ladylove. At the same time, he emitted a crescendo of hisses that to my prosaic ear sounded like a distant freight train leaving the Lehigh station. When his head-shaking became so rapid that it all seemed one dizzy blur to my eye, he made a quick run to the front of the stuffed female and struck a manly pose, which he held for nearly five minutes by the watch.

Each spring since this record was made the old drummer has returned to his log and April thunder has rolled through Sapsucker Woods. The log will not last forever and ruffed grouse are not immortal, but there will be other logs and other grouse, and let us hope that the children and grandchildren of the old drummer will continue to intrigue succeeding generations of Cornell students. □

"Spring Thunder" first appeared in the spring 1947 issue of *The Cornell Plantations.* Special thanks to Arthur A. Allen Papers, Department of Manuscripts and University Archives, Cornell University Libraries.


BIRD
SANCTUARY
NO
TRESPASSING

SMALL WORLD

THOMAS S. LITWIN

It's been my impression that the media usually don't pay too much attention to birds until a species is officially listed as endangered. This observation was confirmed as I stood on a beach of Long Island's south shore with a local reporter talking about the newly listed piping plover. Trying to provide him with background on the causes for habitat loss facing birds around the world, I explained that the human population has doubled since 1950 and now stands five billion strong. As he accepted this number politely, I glanced over his shoulder and became distracted by two adult plovers that were attempting to shepherd three chicks from their dune nesting area to the tide line for feeding.

With my eye still on the plovers, I said, "In the near future, half the world's human population will live in urban and suburban centers. This can't do anything but negatively affect large numbers of species."

Each time the plovers got near the tide line someone would walk by, causing the birds to flee to the safety of the dune. They were even more panicked by the fast approach of a jogger. As I watched, the plovers made about a dozen trips across the beach and didn't spend more than a few minutes actually feeding. The economics of the situation weighed heavily against the chicks.

Straining to focus on the reporter instead of the chicks, I said, "Three-quarters of the United States, 165 million people, now live on either coast. We're consuming over two million acres a year to meet the needs of suburban growth."

By this time one distraction was blurring into another. An argument had developed between some beachgoers wanting to set up a volleyball net on the edge of a vulnerable colony of least terns and a resident who had taken up the cause of least tern protection. She was dead set against the idea. Voices swelled as the two philosophies butted—jazzercise meets Rachel Carson.

Farther up the beach, bodies stretched out on beach blankets mingled with frisbee throwers. I could now make out what had been just a speck on the horizon: a blimp advertising Fuji film moved along the crowded shoreline, its immense shadow looming over sand, sunbathers, and incubating terns. The portrait before me, framed by the reporter's head and shoulders, would have challenged the imagination of Salvador Dali.

By now the reporter had had enough of my drifting and wanted to get down to business.

"So," he said, "Why is the piping plover endangered?"

"Look around," I said as plovers and terns merged with volleyballs, joggers, and blimps.

What the reporter saw was no different from what chroniclers of human events have been witnessing for thousands of years—people gathering, communicating, and interacting, spreading themselves across the landscape. What we at the Laboratory of Ornithology's Seatuck Research Program are seeing is the complicated crossroads where human sociology and wildlife ecology meet.

The results can be as subtle and elusive as the relationship between a plover chick's food needs and a person walking on the beach, or as blatant as a misguided volleyball smashing a nest of tern eggs. Regardless of the means, the end is usually the same.

The Seatuck Research Program was created in cooperation with the U. S. Fish and Wildlife Service (USFWS) for the very purpose of examining how expanding human populations affect wildlife. Located on the 200-acre Seatuck National Wildlife Refuge, Islip, Long Island, the program was made possible through the generous assistance of Charles D. Webster, a Laboratory board member.

Long Island is an ideal outdoor laboratory because it mimics world trends of increasing human population, expanding urban centers, and rapid loss of natural habitat. It also has a variety of habitats for a relatively small area—hardwood forests, pine barrens, salt marshes, barrier beaches—and a full complement

Sign of the times—the Earth is a finite planet with limited resources. When humans and birds compete for the same space, birds usually lose. At Jones Beach on Long Island, for example, sunbathers intrude on a least tern colony.

ROBERT VILLANI

Birds do occasionally gain ground. The abandoned Floyd Bennett Airfield in Brooklyn is part of a wildlife preserve where declining grassland species, such as the eastern meadowlark, below, can nest in peace. By marking individual birds with color bands, Seatuck researchers can track them and learn more about their habitat requirements.

TOM LITWIN (2)

RON AUSTING (PHOTO RESEARCHERS, INC.)

of endangered species, including the piping plover and least tern.

Interestingly, the value of studying Long Island is that it is not unique. Rather, it is a microcosm of what the northeastern coast of the United States is now or will become in a few more years—a megalopolis where wildlife habitats will become increasingly fragmented and isolated by human cities and suburbs. At Seatuck we are studying what happens when wildlife and humans compete for the same resources.

Like generations of ecologists before us, we have found that birds are constantly telling us about the natural world. Birds are the result of millions of years of adaptation to a gradually changing environment. On Long Island, the birds are giving us a clear message—the landscape is changing faster than many birds can adapt.

At Seatuck we are conducting a number of studies around Long Island that explore how birds are influenced by the rapid expansion of suburbia. Although the bird species and habitats may vary among our studies, the influences of urbanization on birds are quite similar.

One of our studies compared the populations of birds nesting in the Seatuck Refuge to those nesting in the surrounding neighborhoods. When the study began we predicted that woodland birds that migrate to the refuge each year, such as red-eyed vireos and wood thrushes, would eventually increase in number and start to nest in the surrounding neighborhood. We were concerned about woodland migrants because their numbers have been declining throughout North America. But our prediction was wrong; woodland birds were not increasing. We found that the neighborhood nesters, such as house sparrows and starlings, dominated the area, including the refuge.

Why weren't the migratory woodland birds doing better? We found out when we compared the neighborhood vegetation to that of the refuge. Although the refuge lacked the conspicuous rows of houses and miles of paved roadways, its patchwork quilt of habitats was not unlike that of the neighborhood. We humans were concentrating on the absence of buildings while the birds were evaluating the relation of one vegetation grouping to another. As a result, the neighborhood house sparrows and starlings competed successfully and sometimes overwhelmed the woodland birds on the refuge.

It became apparent that our notion of what a wildlife preserve was supposed to be was not necessarily shared by the birds. These findings also challenged our idea of what a preserve should accomplish. Are we really preserving bird species simply by putting a fence around a piece of property? Is a suburban wildlife refuge just a parcel of land without houses?

We were not alone in questioning the function of urban preserves. The U.S. Park Service and the New York City Audubon Society had similar concerns regarding Brooklyn's 1,400-acre Floyd Bennett Field, which is part of the Gateway National Recreation

Area. In 1984, Seatuck joined them in an effort to plan Floyd Bennett Field's future as a preserve.

Upon our first visit to Brooklyn I was again struck by the curious juxtaposition of images which told me we were at a crossroads. Standing on the abandoned runways just across Jamaica Bay from Manhattan's eight million people, we were surprised at how much taller the World Trade Center was than the Empire State Building. Our attention climbed higher as a Concorde took off from JFK Airport. The supersonic jet would be in Britain in three hours. Meanwhile the snowy egrets feeding in an adjacent marsh were oblivious.

On these runways John Glenn launched his famous record-breaking cross-country flight, and Wrong Way Corrigan embarked upon his misadventure that landed him in Dublin instead of California. The challenges of flight had ironically changed from those of plastic, steel, and fuel to those of muscle, bone and feather. The once important runways were now secondary to the shrubby infields. In parts of the country where open space is taken for granted, these infields would be inconsequential. Here, in the midst of one of the world's largest urban complexes, they represented an opportunity to restore bird populations that are disappearing from the local landscape.

For two years we identified what birds nested at Floyd Bennett Field and the number of individuals of each species. By analyzing the vegetation within the nesting areas, we were also able to learn how the birds used the various habitats.

With this local ecological study in hand, we compared the bird species nesting at Floyd Bennett Field to the birds found nesting throughout Long Island. Unlike the Seatuck Refuge study, for which we surveyed the surrounding bird populations ourselves, this time we used two established databases, the USFWS Breeding Bird Survey and the New York State Breeding Bird Atlas. These allowed us to extend our comparison of Floyd Bennett Field's bird list well beyond the immediate vicinity.

Interestingly, we discovered a pattern similar to the one on the Seatuck Refuge. Floyd Bennett Field's breeding birds were fairly representative of the nesters found anywhere in the Long Island suburbs, with two important exceptions. Two grassland species, the grasshopper sparrow and eastern meadowlark, were found nesting in Floyd Bennett Field's remaining grasslands but were otherwise quite uncommon on Long Island.

The reason that these grassland birds are rare is straightforward: the post-World War II economic boom that brought Long Island the original Levittown and one-stop shopping malls also created unprecedented rates of development. Grasslands went first because they were the easiest to build on. When the dust settled, the largest grassland east of the Mississippi, Long Island's 60,000-acre Hempstead Plains, was reduced to a beleagured 19 acres. No habitat, no birds.

Based on our findings, the U.S. Park Service de-

Unfortunately for them, piping plovers nest on exactly the sort of habitat where people congregate en masse on summer weekends. The birds' eggs, laid in shallow scrapes on sandy beaches, are especially vulnerable to wayward frisbees and volleyballs. The future of the birds rests in our willingness to keep out of their few remaining breeding sites.

cided to create habitats at Floyd Bennett Field that the rare grassland birds would favor. Although this plan will not create the maximum number of bird species at this site by encouraging common Long Island nesters such as the cardinal and mockingbird, it will make an important contribution to the diversity of birdlife and habitats in the region.

No group of birds better illustrates the interwoven history of wildlife and people than Long Island's colonially nesting waterbirds. To study these birds is to study history.

At the turn of the century, Long Island's coastal birds—herons, egrets, terns, shorebirds—found themselves unfortunately close to a prospering New York City that was hungering for food and high fashion. A piping plover foraging on a Great South Bay mudflat could abruptly find itself on a Manhattan restaurant plate being eaten by a woman whose hat was adorned with least tern plumes. By 1918, colonial waterbirds were protected under the Migratory Bird Treaty Act, but not before their populations had been decimated.

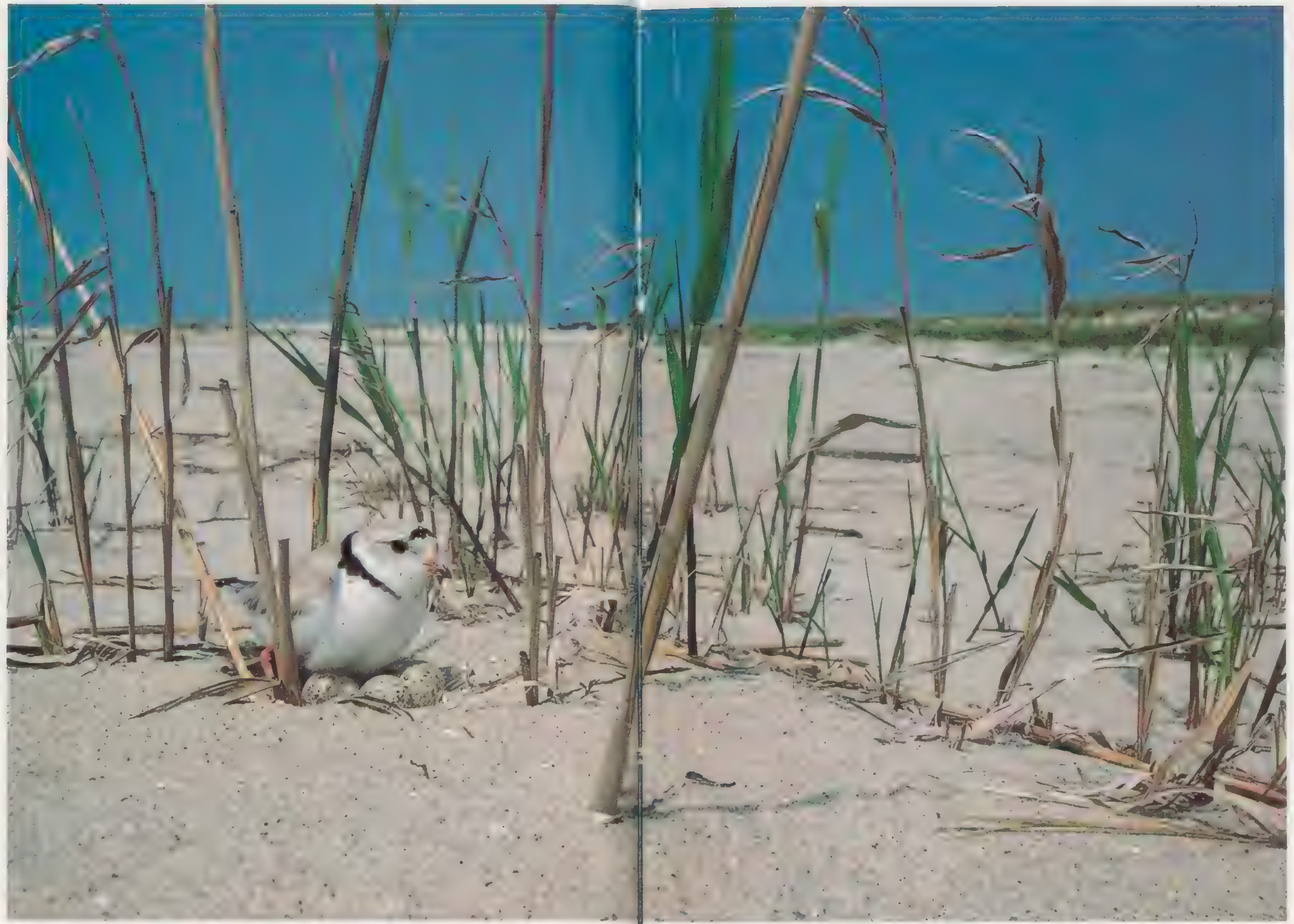
Over the next 50 years these populations recovered to varying degrees, while simultaneously another sociological phenomenon was occurring—leisure time. What better way to relax, be it in a second home, a recreational vehicle, or on a blanket, than at the beach? To accommodate this trend, bridges and houses were built, parkways and parking lots created, and recreation areas opened. Before long, the birds were in trouble again.

When New York State listed the least tern as endangered in 1983, state wildlife biologists contacted Seatuck about the possibility of us conducting an evaluation of its population status. This involved not only counting the number of least tern adults around Long Island's coastline but also identifying colony locations and the possible causes of failed nesting attempts. We also needed a better idea of what was happening to piping plovers that were nesting within least tern colonies.

Seatuck initiated a least tern and piping plover survey in that same year with the support of state tax check-off funds and local Audubon chapter support. With the enthusiastic participation of volunteer surveyors, the effort has grown into the Long Island Colonial Waterbird and Piping Plover Survey, covering the state's entire marine coastline.

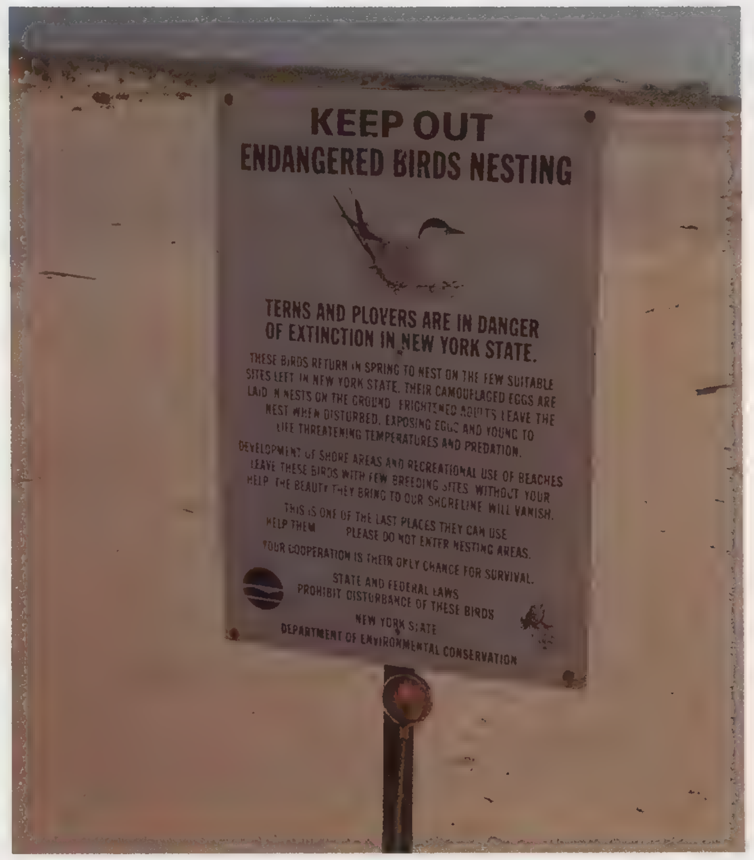
By 1986, 20 species, totaling 120,000 birds, were being monitored. The resulting information allowed government and private biologists to identify the size of each species population and the location of each colony. Most important, we were able to identify which colonies were most vulnerable to development, predation, and other disturbances.

The findings from the first survey in 1983 were mixed. The good news was that Long Island had 46 active least tern colonies with over 4,000 adult terns and 110 pairs of piping plovers. The bad news was that



ROBERT VILLANI (2)

A CASE IN POINT


KEEP OUT
ENDANGERED BIRDS NESTING
TERNS AND PLOVERS ARE IN DANGER OF EXTINCTION IN NEW YORK STATE.
THESE BIRDS RETURN IN SPRING TO NEST ON THE FEW SUITABLE SITES LEFT IN NEW YORK STATE. THEIR CAMOUFLAGED EGGS ARE LAID IN NESTS ON THE GROUND. FRIGHTENED ADULTS LEAVE THE NEST WHEN DISTURBED, EXPOSING EGGS AND YOUNG TO LIFE THREATENING TEMPERATURES AND PREDATION.
DEVELOPMENT OF SHORE AREAS AND RECREATIONAL USE OF BEACHES LEAVE THESE BIRDS WITH FEW BREEDING SITES. WITHOUT YOUR HELP, THE BEAUTY THEY BRING TO OUR SHORELINE WILL VANISH.
THIS IS ONE OF THE LAST PLACES THEY CAN USE
HELP THEM PLEASE DO NOT ENTER NESTING AREAS.
YOUR COOPERATION IS THEIR ONLY CHANCE FOR SURVIVAL.
STATE AND FEDERAL LAWS PROHIBIT DISTURBANCE OF THESE BIRDS
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

TOM LITWIN

from a U.S. Fish and Wildlife Service news release dated July 16, 1987

The U.S. Fish and Wildlife Service is offering up to $1,000 reward for information leading to the arrest and conviction of the person or persons who shot and killed a piping plover on Long Island on June 30. The piping plover is classified as "threatened" along the Atlantic Coast under the Endangered Species Act.

The small, sandy-colored bird was discovered about 4 p.m. on an eastern Long Island beach by a member of the Seatuck Research Program who was checking nests of plovers and terns. It appears to have been shot below the wing with a shotgun. Its nest was nearby, with three young birds in it. One young has since disappeared; the other two young are being cared for by the surviving adult.

"It is disgraceful that anyone would shoot a protected species," said Howard N. Larsen, northeast regional director of the U.S. Fish and Wildlife Service. "I urge anyone who may have information to report it as soon as possible. The piping plover, although not as majestic or well-known as the bald eagle, enjoys the same protection under the Endangered Species Act and we intend to prosecute just as vigorously."

Wildlife law enforcement agents from the service and the New York State Department of Environmental Conservation are investigating the shooting. Potential penalties under the Endangered Species Act could include a $20,000 fine or a year in jail, or both. The Endangered Species Act prohibits harassing, harming, or pursuing protected species, including collection or destruction of their eggs or nests.

BHL

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LANG ELLIOTT (4)

85 percent of the colonies were disrupted by human activity. The piping plover population, which had exceeded 500 pairs in 1950, had precipitously declined by 80 percent. The human pressures that were affecting the red-eyed vireo on the Seatuck Refuge and the grasshopper sparrows at Floyd Bennett Field, were also a factor on the beach.

No single organization could hope to protect so many colonies over such a wide area. At a meeting that included Seatuck, the New York State Department of Environmental Conservation, The Nature Conservancy, and the National Audubon Society, all agreed that a cooperative colonial waterbird protection program was needed. The Long Island Colonial Waterbird Association was formed with the primary purpose of waterbird conservation.

For years, local Audubon chapters had been protecting tern colonies by putting fences and warning signs around colonies as well as by educating the public. These efforts were used as the model to create a regionwide colony-protection program that now covers over 150 sites.

Long Island Colonial Waterbird Survey data have also helped protect birds beyond the immediate region. Two species we surveyed, the roseate tern and piping plover, are threatened worldwide. Our survey data have helped the USFWS determine that the piping plover should be given protection as an endangered species and that the roseate tern may need the same.

These protection efforts have addressed the short-term needs of Long Island's colonial waterbirds. But with the persistence of colony disturbance and the continued loss of nesting habitat to development, it would be naïve to think that the long-term ability of these birds to maintain their populations is anything but shaky. In trying to predict the birds' future, we had to ask a fundamental question: Are least terns and piping plovers able to produce enough offspring to replace the yearly loss of adults? If they aren't, they will be removed from the endangered species list and placed on the growing list of extinct species.

We have begun to take a closer look at the ability of both species to produce young, using support from the USFWS and from New York State. Preliminary results from the studies have been interesting. Least tern colonies vary significantly in the number of chicks they produce depending on the severity of their problems. The occasional misplaced frisbee is no tragedy, but regularly misplaced frisbees in concert with a romping dog will impair the ability of the adults to feed and protect chicks. A Fourth of July weekend with good weather spells reproductive disaster for a tern colony because of the intense human activity coinciding with the height of the nesting period.

The colony protection efforts have helped to control some of these problems, but there is a catch. Each year up to a third of the terns abandon their colonies in favor of new locations. Although this is an effective adaptation for a species living at the ever-changing edge where land meets sea, it makes the protection of any one site complicated. You may finally learn the problems of a particular colony and how to protect it, or even buy the land as a preserve, only to have the birds leave the site for another. Because least terns are continually selecting new colony sites, their survival lies in our establishing a regional system of protected habitats which will cover many potential sites.

Seatuck monitors a Long Island least tern colony: far left, newly hatched chick and three-day-old sibling; below, researcher captures an adult, takes its vital statistics, and then releases it unharmed. Near left, adult terns feed and incubate chicks. These birds are tricky if you're planning a refuge for them. Researchers at Seatuck have found that many individuals do not return to the same nesting ground each year. Instead, they leave the site in favor of a new location, one that may not be protected. The birds' survival lies in a regional system of protected habitats which cover many potential sites.

The least terns' problems occur within the colony; the piping plovers' start when they leave it. On Long Island the greatest threat to a young plover's survival begins right after hatching. Being adapted to the wide-open spaces of a flat beach, the chicks are out of their nest scrapes and feeding within a few hours of hatching. Their instincts lure them across the open beach to the tide line where food is abundant. It is on this trip that they come to know the ways of humans.

As the reporter scanned the summertime scene, I struggled for a simple answer to his question: "Why is the piping plover endangered?" I smoothed the sand with my sneaker and looked out over the ocean. I couldn't help recalling John Steinbeck's comment that we are a "two-legged paradox." A species not yet "jelled," bound to the instincts of the past yet drawn into the future by consciousness and thought. Through our research we are gaining insights into how we can protect species and habitats. Yet our population expands as it has for thousands of years while the list of endangered species grows longer. Here we stood, on a beach, right in the middle of it. ☐

Tom Litwin is director of the Seatuck Research Program.

DATA THAT COUNT

GREGORY S. BUTCHER

Central Park, New York. Winter 1946. Courtesy Department Library Services, American Museum of Natural History

Each year thousands of bird watchers throughout North America participate in Christmas Bird Counts, on which they count all the birds within a specified area. The counts began in 1900 and are both fun and useful. Many birders consider their count the social event of the year. At the same time, data from the counts can be analyzed to reveal trends in winter bird populations.

The first time I participated in a Christmas Bird Count (CBC) was December 1965. I was 13. The event was memorable for several reasons. I saw many good birds, including my first rough-legged hawk, and that evening I met Roger Tory Peterson and had my field guide autographed by him! My mom spent the entire day worrying that I hadn't worn my mittens, but our group had been followed by the local newspaper photographer, and a picture of me wearing mittens reached home before I did. I not only enjoyed the CBC, I established enough credibility with my mother so that she let me go on other bird counts.

At the time I didn't realize that CBCs had begun in 1900, as a result of an editorial by Frank M. Chapman in *Bird-Lore* magazine. Chapman proposed a Christmas bird census to replace the traditional Christmas "side hunts," in which two teams of hunters were formed to kill "practically everything in fur or feathers that crossed their path." Even in that first editorial Chapman foresaw that his new project would "constitute, in a measure, a census of Christmas bird-life."

That first year, 25 CBCs were held, involving 27 observers from 13 states and 2 Canadian provinces. In the winter of 1986–87, 1,504 CBCs took place, involving 38,346 observers from all the states and provinces, the West Indies, Central America, Venezuela, Guam, and Saipan. This upswing reflects the tremendous growth in interest in bird watching. Count results are published by the National Audubon Society in *American Birds*.

Under the sponsorship of Audubon, the CBC gradually has become standardized. All counts are held within a 15-mile-diameter circle on a single day within two weeks of Christmas. The observers are divided into parties of one to a dozen individuals. Each party keeps track of the number of hours spent in the field, miles traveled, and birds seen.

CBCs have provided an amazing amount of information on the distribution, abundance, and long-term population trends of North American birds. Biologists trying to make sense of this huge body of data, however, were initially overwhelmed by the need to copy all the information by hand in order to conduct their research.

In the early 1970s, Professor Carl Bock at the University of Colorado took steps to remedy this problem by computerizing 10 years of CBC data. Using the data he answered a number of questions about the distribution and abundance of North American birds in winter, including why birds are found where they are, and why they are more abundant in some areas than others. Bock also examined the short-term population changes of North American birds but was limited because 10 years of data are not enough to determine long-term trends. For example, ruffed grouse may have a 10-year population cycle with population peaks separated from each other by 10 years.

Accurate numbers about population trends are important for two reasons: to establish which conservation issues are most pressing and to monitor the health of the environment. Without quantitative information, conservation priorities would be set according to the hunches of wildlife biologists. Also, without detailed information, a slow decline of a species or a subtle environmental change might go undetected. Finally, the better documented any environmental problem is, the easier it is to muster significant action. For example, a lot of information had to be collected to show not only that DDT was adversely affecting bird populations but also how it was interfering with them before the insecticide was banned in the United States in 1972.

After reading some of Bock's articles, I was impressed with his ability to use CBC data to learn important facts about North American birds in winter. I felt that the best way to follow up on his work would be to add the long-term view that he had been unable to study with only 10 years of data.

I then discovered that the Laboratory of Ornithology was also interested in the short- and long-term population trends of North American birds using CBC data. The CBC project has all the ingredients of

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PRESTON P. MACY (PHOTO RESEARCHERS, INC.)

This, the December 1900 editorial by Frank M. Chapman in Bird-Lore, *is in many ways the Gettysburg Address for birders, an inspiration and call-to-arms for them to go out and count the birds.*

> It is not many years ago that sportsmen were accustomed to meet on Christmas Day, "choose sides," and then, as representatives of the two bands resulting, hie them to the fields and woods on the cheerful mission of killing practically everything in fur or feathers that crossed their path—if they could.
>
> These exceptional opportunities for winning the laurels of the chase were termed "side hunts," and reports of the hundreds of nongame birds which were sometimes slaughtered during a single hunt were often published in our leading sportsmen's journals, with perhaps a word of editorial commendation for the winning side. We are not certain that the side hunt is wholly a thing of the past, but we feel assured that no reputable sportsman's journal of today would venture to publish an account of one, unless it were to condemn it; and this very radical change of tone is one of the significant signs of the times.
>
> Now *Bird-Lore* proposes a new kind of Christmas side hunt, in the form of a Christmas bird-census, and we hope that all our readers who have the opportunity will aid us in making it a success by spending a portion of Christmas Day with the birds and sending a report of their "hunt" to *Bird-Lore* before they retire that night. Such reports should be headed by the locality, hour of starting and the temperature; the latter taken when starting. The birds observed should then be added, following the order in which they are given in the A. O. U. "Check List," with, if possible, the exact or approximate number of individuals of each species observed.
>
> Promptness in sending these lists to *Bird-Lore* is urged in order that the best of them may be published in our February number, where they will be not only of interest to other participants in the "hunt," but will also constitute, in a measure, a census of Christmas bird-life.

a high-priority project for the Bird Population Studies program of the Laboratory: the data are collected by volunteers, require computer management, provide information about the winter biology of North American birds, and are of great interest to birders, ornithologists, and environmental policymakers.

Thus, the Lab and I committed ourselves to a CBC population project. Our first step was to add 15 more years to Carl Bock's 10-year database. We have added 5 more years already and are currently computerizing the rest. Once we have completed a 25-year database, we face a challenging, expensive, and time-consuming task: the creation of a 25-year summary of the population trends of the more than 200 species well-represented on CBCs.

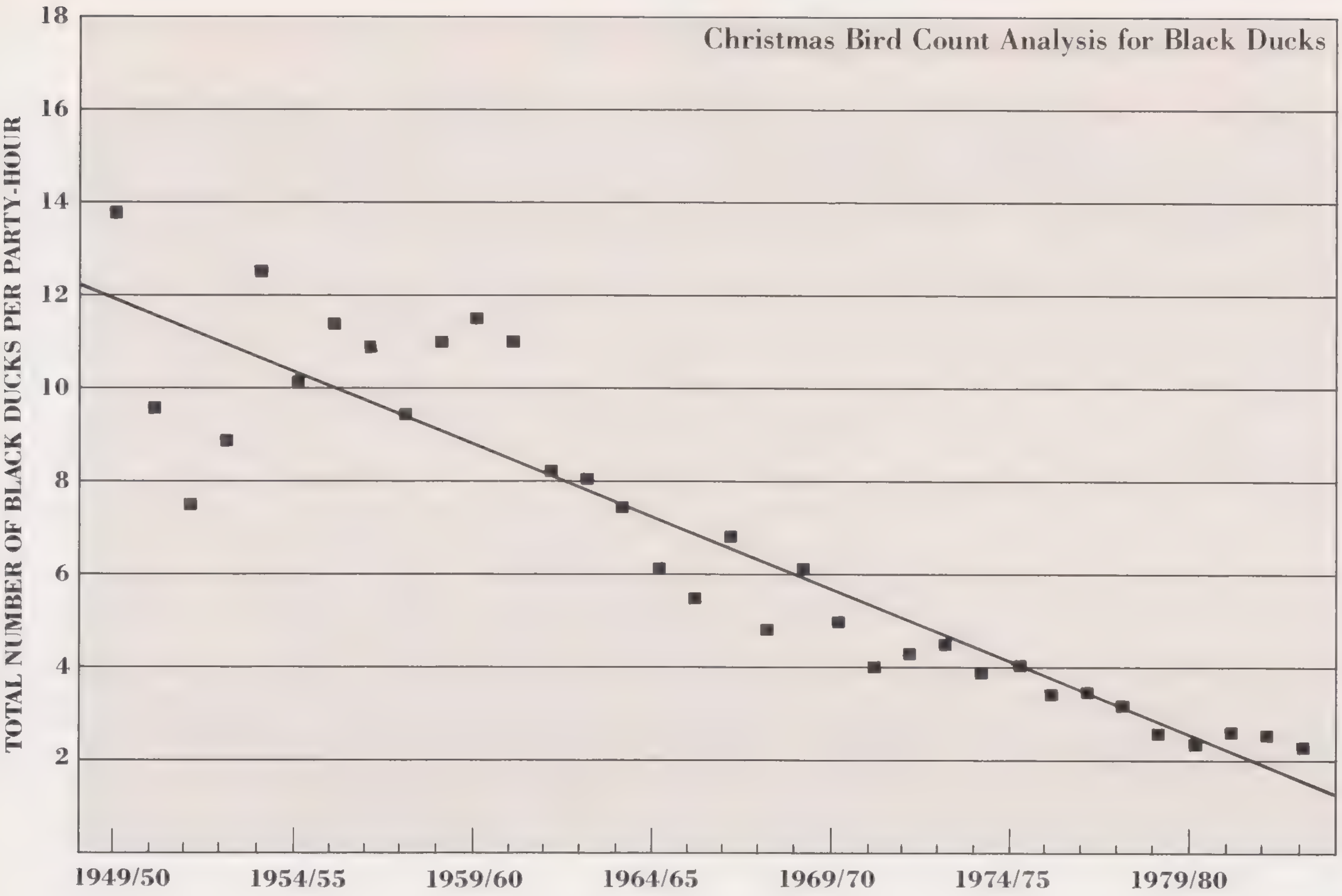
Although the database is not yet complete, we have finished a few studies that show the value of CBCs for monitoring bird populations, the most significant being one on black ducks. Because the U.S. Fish and Wildlife Service (USFWS) has long been concerned about black duck populations, in 1984 the agency asked us to look at black duck trends on CBCs. The questions the USFWS posed were: Is the black duck declining? If so, how fast?

After 16 months of work we found the sobering answer: the population has experienced a decline of about 3.6 percent per year. The total population for the winter of 1982–83 was between 20 percent and 45 percent of the total for the winter of 1949–50.

These results confirmed those from the service's aerial Mid-Winter Waterfowl Inventory, which suggested that the number of black ducks migrating along the Atlantic Flyway during the mid-1980s was less than half what it was in the mid-50s. Grave concern has been expressed about the plight of the black duck. In 1982, for example, the Humane Society of the United States and the Maine Audubon Society brought suit against the USFWS for a moratorium on black duck hunting. Although the two groups lost their court case, more restrictive hunting regulations for black ducks were implemented in 1983. This action resulted in 17 percent fewer black ducks being shot along the Atlantic Flyway in 1983 than in 1982.

Of all the possible reasons for the decline in black duck numbers, CBC data allowed us to study only competition between black ducks and mallards on their wintering grounds. Biologists have long been interested in the interactions of black ducks and mallards and how the two species vie for food and space; also the birds are similar enough to each other to hybridize extensively, and mallards have expanded considerably into the range of the black duck.

I was among those ready to believe that winter competition with mallards might account for the black duck's decline. While growing up in Connecticut I had seen more and more mallards every year; however, we found no evidence whatsoever that winter competition with mallards was causing black ducks to decline. By comparing the areas of mallard increase with



The Laboratory of Ornithology's program in Bird Population Studies is analyzing data from Christmas Bird Counts. The largest study to date has focused on the black duck (below). Graph at left shows the total number of black ducks seen per hour of observation on all counts from 1949 to 1983. The steady and worrisome decline, whose cause is unknown, has long been suspected by bird watchers, hunters, and biologists alike. Bird Population Studies believes that similar analyses of other bird species may aid conservation efforts.

the areas of black duck decrease, we showed that black duck populations were relatively stable in areas where mallards were increasing. The finding was the same when we looked at specific locations in the northeastern states: where mallards increased the most, black ducks did relatively well.

Thus, I have concluded that winter competition with mallards is unlikely to be an important cause of black duck declines. However, we have not studied competition that occurs on the ducks' breeding grounds or hybridization between the two species.

The Humane Society and others are convinced that overhunting is the major cause of black duck declines. The Izaak Walton League thinks acid rain, which appears to inhibit the survival of ducklings, is the most likely culprit. Certainly a factor is the disappearance of suitable wetland habitats which has occurred over the past 30 years.

While searching the data for the reasons for black duck declines, I noticed that almost all the species of dabbling ducks along the Atlantic Flyway were declining: gadwall, blue-winged teal, shoveler, American wigeon, green-winged teal, and northern pintail. Since most of these species breed in the potholes of the Great Plains and other areas hard hit by drought and conversion of the wetlands into farms, the demise of those ducks might be a result of a completely different cause than the decline of the black duck, which largely breeds in the Northeast. On the other hand, degradation of the birds' wetland wintering grounds may be affecting all species of dabbling ducks.

I also noticed that many species of geese and swans have been increasing along the Atlantic Flyway. Tundra swan, mute swan, Canada goose, snow goose, and blue goose are all increasing. The increase of geese and swans and the decrease of dabbling ducks may be coincidental, but there may be a connection. Perhaps the birds compete for "safe space" on the wintering grounds, habitat that is protected from harsh weather and predators. If they do compete, the dabbling ducks would certainly lose to the larger geese and swans.

The current status of the black duck story is discouraging. After at least 35 years populations are still declining and we don't know the causes. However, now that we are certain what is happening to the population, we can concentrate on why.

We also have done other pilot studies using CBC data, notably one on birds of prey. After studying the populations of eight species of raptors between the early 1970s and the early 1980s, we found that six of the eight went up over that decade: those of the bald eagle, red-tailed hawk, northern goshawk, merlin, prairie falcon, and gyrfalcon. Peregrine falcon populations remained stable, and Harris' hawk populations showed a decline.

Our experience confirms our belief that CBC information adds significantly to our understanding of the status of North American bird populations. We look forward to studying all the species that are frequently encountered on CBCs to fill the many gaps in our knowledge of the status of our birds. □

Greg Butcher is director of the Laboratory of Ornithology Bird Population Studies program.

Further Reading

The fourth number of each volume of *American Birds.*

Hansen, Paul W. *Acid Rain and Waterfowl: The Case for Concern in North America.* Izaak Walton League of America, 1701 North Fort Myer Drive, Suite 1100, Arlington, Virginia 22209. February 1987.

W. CURTSINGER (PHOTO RESEARCHERS, INC.)

Halcyon days in The Gambia...

Grey-headed Kingfisher, *halcyon leucocephala*. Photograph by Stephen J. Krasemann/DRK Photo

This little insect-eating kingfisher is one of 1,100 species of birds in West Africa, many of which do not occur elsewhere in the world.

Don't miss MOT's tour to The Gambia and Senegal in January 1988 to be led by Nick Riddiford, warden of Fair Isle Bird Observatory and noted British authority on Old World and African birds. In his lifetime he's banded over 100,000 birds. He'll delight in showing you the *Halcyon leucocephala* plus 5 or 6 other kinds of kingfishers among the 400 species of birds you are likely to see. Why not join him?

For more information, write to Dept. L:

MOT

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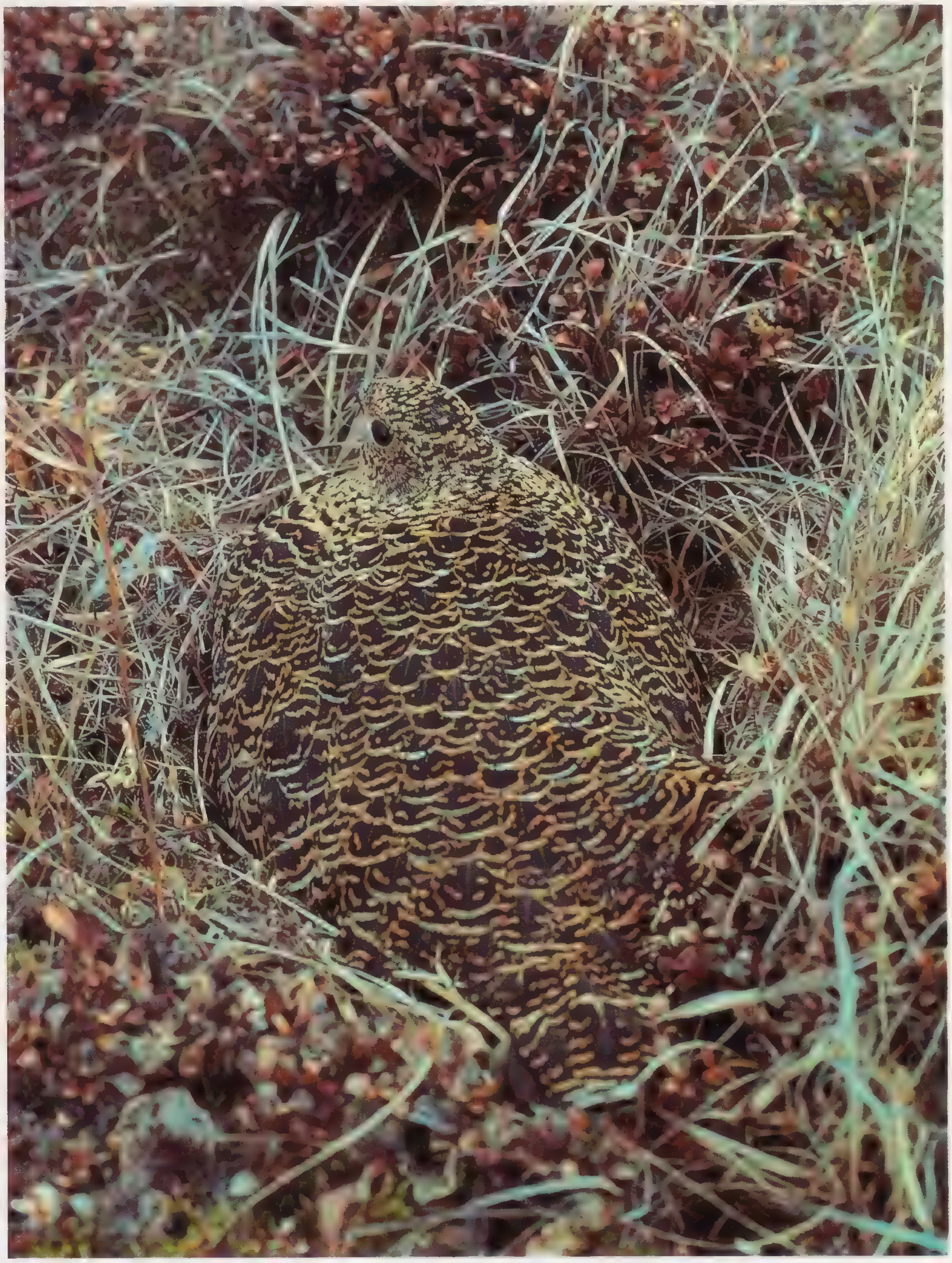

DOUG PLUMMER

Here's Looking at You

One of my jobs during the summer I spent on the Arctic National Wildlife Refuge in Alaska was to find nests. Finding the nest of most birds—sandpipers and longspurs, for instance—is a skill that takes patience to develop. You flush the bird out of hiding, register where it came from and, maybe, find eggs concealed under a tuft of sedges. If that doesn't work, you lie on your stomach and wait for the bird to return, so you can flush it again. But finding a rock ptarmigan nest takes no skill at all. As you walk across the tundra, look occasionally at your feet and you may see a female staring back at you. The bird's coloring is so cryptic that it matches the mottled browns of the early summer tundra. Blending in is a good way to elude aerial predators such as jaegers, and bipeds such as researchers. The birds also behave as if they believe they are invisible. They don't move. I think I could have lifted one, counted the eggs, and set her down without ruffling a feather.—**Doug Plummer**

Strange World

KATY PAYNE

AUBREY LANG (VALAN PHOTOS)

On the vast African veld, elephants maintain complex societies over distances too great for the animals to see one another. Furthermore, they seem nearly silent. What strange system do the elephants use to communicate?

We humans rely heavily on our sense of sight to help us experience the world around us. We tend to describe everyday phenomena in visual terms because this is how we have evolved to interpret the outside world. But not all animals relate as we do. Dogs, for example, use smell as their principal source of information. Spiders feel their way with sensitive legs across the forest floor, and pigeons may use the Earth's magnetic field as a compass to help find their way.

As science explores the nonvisual information that is important to other animals, a new and very different world emerges, a world "beneath" the one we see.

The acoustic part of this strange world has long been of interest to the Cornell Laboratory of Ornithology. It houses the largest collection of recorded animal sounds in the world. The collection is called the Library of Natural Sounds, a name I find very moving because it brings to mind the vast growth in knowledge and understanding made possible by libraries of human literature. Compared to libraries of human works, the Library of Natural Sounds is small and little used, but for revealing the nature of other species its potential is enormous. With this potential in mind, the Lab has launched its newest program, the Bioacoustics Research Facility, which brings together people and equipment to study all sorts of questions about all sorts of sounds made by all sorts of animals.

Such a center for research on animal sounds has been a glint in the Laboratory's eye since it pioneered in the recording of animal sounds in the 1930s. That's one reason why in 1984 Bill Langbauer and I were given the opportunity to make the Lab home base for our study of communication among elephants. We knew little about elephant communication at that time, except that the huge animals seemed strangely silent. But we had a hunch . . . .

Is this all there is? That is what I wondered while packing to leave the Washington Park Zoo in Portland, Oregon, one day in 1984. During four days in a cage listening to elephants, I had heard puzzlingly few sounds. Only when the elephants were outside had I heard a few excited barks and trumpetings. While inside all was quiet except for the slow, sleepy flapping of ears against necks; the scraping of hay and trunks along a cement floor; the flipping of tails against a cement wall; and an occasional low, soft, purrlike rumble that spread through the group of elephants, then died down.

LEONARD LEE RUE III

Is this all there is in one of the most sophisticated animal societies we know? Do elephants maintain family relations with so little acoustic communication? Where are the complaints, warnings, reprimands, announcements, plans? The jokes, songs, conversations to break the monotony of the cage? Are zoo elephants broken-spirited? Or is there some secret?

I had already spent much time contemplating the affairs of mysterious animals. For 17 years, with my husband, Roger Payne, I had studied the complex and constantly changing songs of humpback whales. It was hard not to fantasize that these songs might reflect a creative and communicative society. But since almost everything whales do is under water, we could not be sure what their songs really meant to them. After so many years of guessing, I longed to study communication among animals I could watch. Imagine my frustration when I found that the highly visible elephant seemed to make little use of sound!

But on the plane going back east I remembered something else that happened in the elephants' cage. Every once in a while I had felt a throbbing in the air,

CLEM HAAGNER (ARDEA PHOTOGRAPHICS) (2)

as if a big engine had been started, or as if it were thundering—but there was no engine, no storm, and I'd heard no sound. After 10 to 15 seconds, each session of throbbing had stopped abruptly. Sometimes the air had throbbed several times in succession, sometimes only once.

Then I remembered that humans are not able to hear all the sounds that surround us. We can't hear sounds that are too high, such as those made by bats, shrews, and porpoises for communication and orientation; or sounds too low in the range called infrasound—very low-frequency vibrations generated by massive movements of massive bodies such as earthquakes, storms, volcanic eruptions, and tidal waves. But sometimes low-frequency vibrations can be felt, and I had felt some strange vibrations while at the zoo. I wondered: Could elephants call to one another using infrasound?

To test this idea, I got advice and borrowed equipment from some acoustics experts, Bob Capranica and Carl Hopkins at Cornell University, and Dave Wickstrom at the Cornell Laboratory of Ornithology. Then Bill, Elizabeth Thomas, and I went back to the zoo for a month. Using sophisticated equipment that could record infrasound, we recorded elephants with the tape running very slowly. Then we played the tapes back at 10 times their original speed. This raised the pitch of all sounds by more than three octaves, and suddenly hundreds of elephant calls became audible!

We had perceived only a few of the calls at the time they were being made; some we had felt as throbbing, others we had heard as low, purrlike rumbles. These rumbles, we later learned, were actually overtones, or harmonics, of calls whose main components, lower and stronger than harmonics, were inaudible to us.

Most of the calls, audible and inaudible, had occurred in clusters, with more than one elephant calling at a time. They had called when their keepers had entered and left their cages, when calves had strayed from their mothers or attempted to nurse from nonmothers, when they had been moved from their barn to the outdoors, and whenever we had seen any sort of commotion among them. On one day several female elephants had a rapid, intense exchange of infrasonic calls with an adult male on the other side of a thick cement wall.

How could we tell that elephants and not some other animal or natural phenomena were making these calls? One of the keepers, Jay Haight, pointed out to us that a thin layer of skin on an elephant's forehead flutters when the animal rumbles. We realized that fluttering can be used as an indicator of calling, and that it gave us a way of knowing when and by which elephant an infrasonic call was being made.

Once we knew that elephants were making infrasonic calls in the zoo, the next step was to study calls in the field. So in January of 1985, I joined Joyce Poole of the African Wildlife Foundation in Nairobi, Kenya, and we began recording calls of free-ranging African elephants in Kenya's Amboseli Park. Our collaboration was a boon to both of us. Joyce had recently finished her Ph.D. thesis on the behavior of male elephants and was starting to study elephant vocalizations, but lacked the equipment necessary for recording infrasound. I had the equipment but not the experience needed for studying free-ranging elephants.

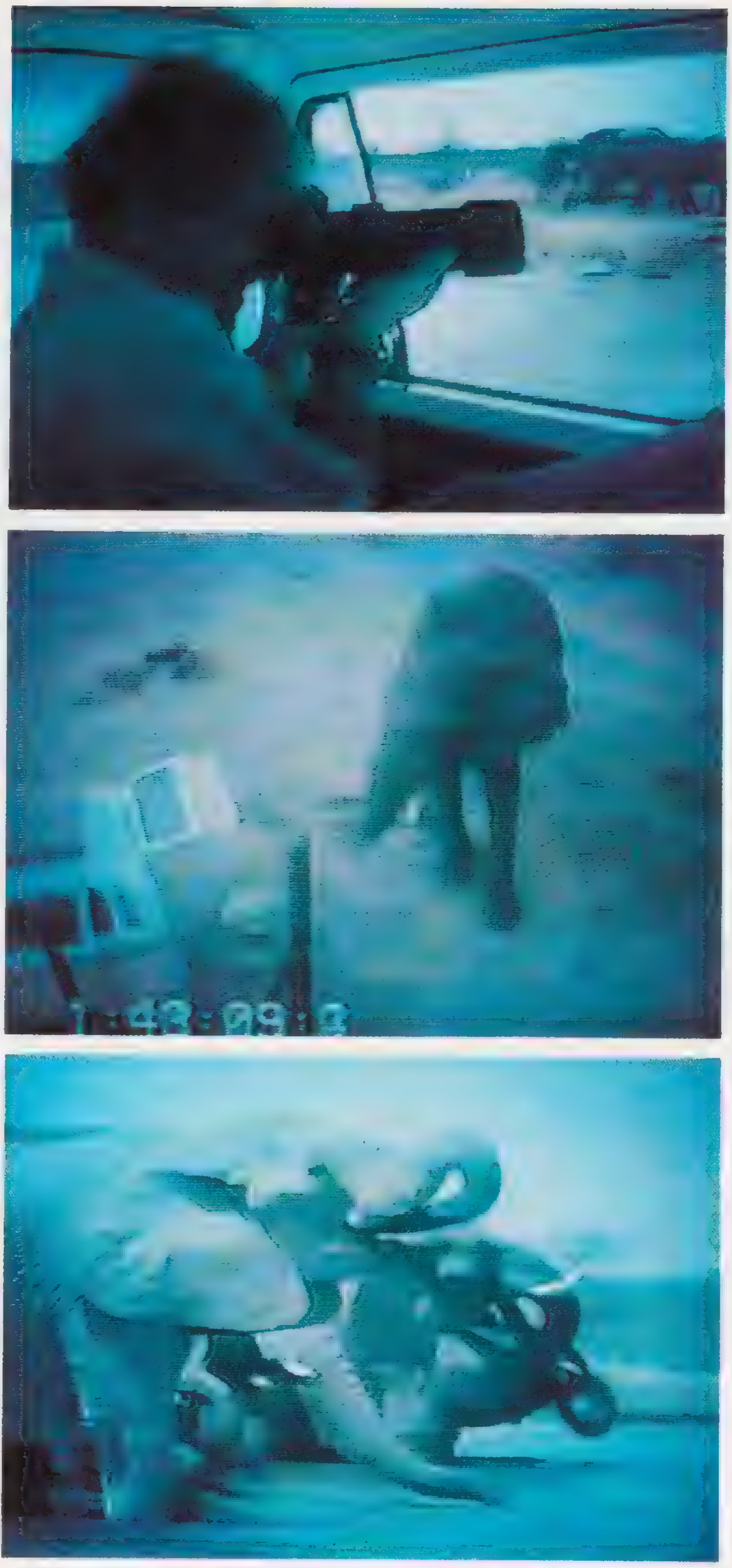
By the time Joyce and I began working together, Bill, Liz, and I were thinking about infrasonic communication in a new way. We had learned that infrasound might be of great value to elephants because low-frequency sounds have excellent transmission characteristics. They can travel much farther than the sounds that humans hear. Calls of the sort we recorded in the zoo could possibly be heard by elephants several miles away. An elephant standing on one spot on the African veld might be able to hear other elephants within an area of 100 square miles. This might explain how elephants organize their remarkably complex society over great distances.

These thoughts were in my mind day after day as Joyce drove me into group after group of elephants. In each new situation she patiently told me who the elephants were and what she thought was going on between them. We recorded the animals and kept extensive notes on their behavior, especially when we heard low rumbles.

By far the greatest variety of calls occurred in family

While elephants seem largely silent, they aren't. They call to each other frequently in a range known as infrasound. Too low for humans to hear, infrasounds can sometimes be perceived as rumblings or throbbings in the air, and can be recorded with special equipment. Many vocalizations occur in family groups (left), and calls often have to do with calves (below) getting lost, wanting to suckle, or trying to run away with each other.

Sometimes elephants seem to hear calls even when no other elephants are in sight, far right. Photos near right are from one of the researchers' videotapes. Using audio and video recording machines, microphones, and a sophisticated sound-altering device, Payne, top, and colleagues determined that elephants do call to others they can't see. Studies are now investigating the possibility that infrasonic calls are used to coordinate social behavior of groups that are too far apart to communicate by any other means.



NATIONAL GEOGRAPHIC SOCIETY

groups. As we had observed in the zoo, most calls had to do with calves getting lost or wanting to suckle or run off with each other, and mothers waiting, reassuring, reprimanding. Other adult female calls seemed to convey greetings, warnings, and preparations to leave an area. Still other calls apparently related to mating, and we wondered if they were audible to distant males.

Certain calls made no sense to us unless we assumed that an unseen animal was involved. Elephants making these calls reminded me of someone getting an idea she doesn't share or an old person being visited by private memories. An example of the latter occurred at a quiet, grassy waterhole in the western part of Amboseli Park, while I watched many elephants from several families. They were drinking and ambling around in a peaceful mood when a large old female walked away from the others. Facing out and away from the bathing, drinking multitude, she spread and raised her ears, and slowly moved her head from side to side as if trying to find something. After half a minute she gave a long, loud rumble, flapping her ears steadily as she called. None of the elephants answered her, which was most unusual. She listened again, called again, listened again.

Who is she calling? Why don't nearby family members answer an animal who appears to be their matriarch? What is she listening for after she calls? Sitting in a jeep by the waterhole, Joyce and I could not answer these questions. We had no way of knowing whether elephants invisible to us were communicating with her and, if so, where the other elephants were.

Meanwhile, with help from experts back at Cornell, Bill was designing apparatus to answer our questions. His innovative equipment got its first use at a waterhole in Etosha Park in Namibia during July 1986. From the top of an observation tower we watched elephants as they approached from all directions. Using audio and video recording machines, microphones, and a sophisticated sound-altering device, we were able to keep track of which elephants were calling.

Through this procedure we learned that elephants that cannot see each other do indeed call to each other. We are now ready to explore the possibility that long-distance, infrasonic calls are used to coordinate the social behavior of groups too far apart to communicate by any other means. We are currently in Etosha again, delving deeper into the strange world of elephant communication.

Elephants are but one of the projects planned for the Bioacoustics Research Facility. Chris Clark, its director, will continue studies he began at Rockefeller University to understand both how swamp sparrows learn to sing and the meaning of whale vocalizations. Timothy DeVoogd of the Cornell Department of Psychology will investigate how a bird's brain works to produce and coordinate different types of songs, and how female birds react to abnormal male songs. Ron Hoy of the Section of Neurobiology and Behavior is working on the hearing ability of insects; he has already discovered that field crickets can hear ultrasound, and he believes the crickets use their hearing to avoid hungry bats. Still other studies will focus on how humans perceive music and on the pitch structure of human songs.

Yet even these examples hardly scratch the surface of what we can learn by using computer techniques to study animal sound. And hardware is only a part of the story. By bringing together faculty from departments as disparate as neurobiology and behavior, psychology, linguistics, engineering, and even music, the Bioacoustics Research Facility may be able to unlock the secrets stored in the vast Library of Natural Sounds. □

Katy Payne is a research fellow at Cornell University. Her work and that of Bill Langbauer is supported by the World Wildlife Fund, National Geographic Society, and National Science Foundation.

Further Reading

Eltringham, Stewart K. *Elephants.* Poole, Dorset Blandford Press. England. 1982.

Ring-necked Pheasant

S*kwa*GOCK. *whrrrrrr.* An explosive cry and muffled flutter stirred us from our sleep. As we gradually came to our senses and were about to ask each other what it was, we heard it again.

*Skwa*GOCK. *whrrrrrr.*

We pulled ourselves out of bed and peered into the low light of an April dawn. On a large rock in the middle of our field was a male pheasant looking in all directions. Suddenly he raised his head, flapped his wings, and rapidly drummed his wings against his body. Although we didn't realize it at the time, this was the start of a fascinating year of watching ring-necked pheasants.

Donald and Lillian Stokes are authors of the Stokes Nature Guides which include *A Guide to Bird Behavior,* Vols. I and II.

What the male was doing is called crowing, a behavior most common in April and May when males are defining and defending their territories. Pheasants usually crow just before and after sunrise and again in late afternoon.

Pheasant territories range in size from about 3 to 9 acres, depending on the quality of the habitat and the dominance of the male. The older a male gets, the larger his territory becomes, for he gains dominance with age and acquires portions of territories from neighboring males that have died. First-year males are unable to acquire prime territories because they lack that dominance and experience. Instead, they either defend a territory in a peripheral area, or they forgo a territory and wait until their second year when they are better able to claim preferred real estate.

ALAN CAREY

S*kwa*GOCK *whrrrrrr* is what male ring-necked pheasants crow as they define their territory each spring. Also at this time they become more aggressive toward one another and fight in defense of territory.

Defenders of low-quality territory may not get a mate; only about half the first-year males with territories breed successfully. If a male has no territory, then he becomes a "floater," roaming about, sometimes sneaking through others' territories and mating with another male's mate; but at best he has only a slight chance of passing on his genes.

Around the same time that the oldest and most dominant males are defending the best territories, the hens begin to gather in small groups to feed in these areas. In this way, each male guards the females against interference from other males, giving the hens maximum time to feed and lay eggs. This mating system is called harem defense polygyny.

Harem defense polygyny occurs in only a few bird species, such as rheas and tinamous, but is quite common among mammals, especially hoofed animals such as deer and antelope. Theories suggest that the habits of pheasants are actually closer to those of hoofed mammals than to those of other birds. Pheasants are large-bodied, ground-dwelling birds that graze on vegetation in open fields and rarely fly.

This lifestyle favors group feeding by females, giving them added protection while grazing in exposed areas. It also means males can gain access to several hens at once by defending a territory around the prime feeding areas. The territorial male also protects the females from rape by lone males, thereby enabling the females to channel all of their energy into egg laying.

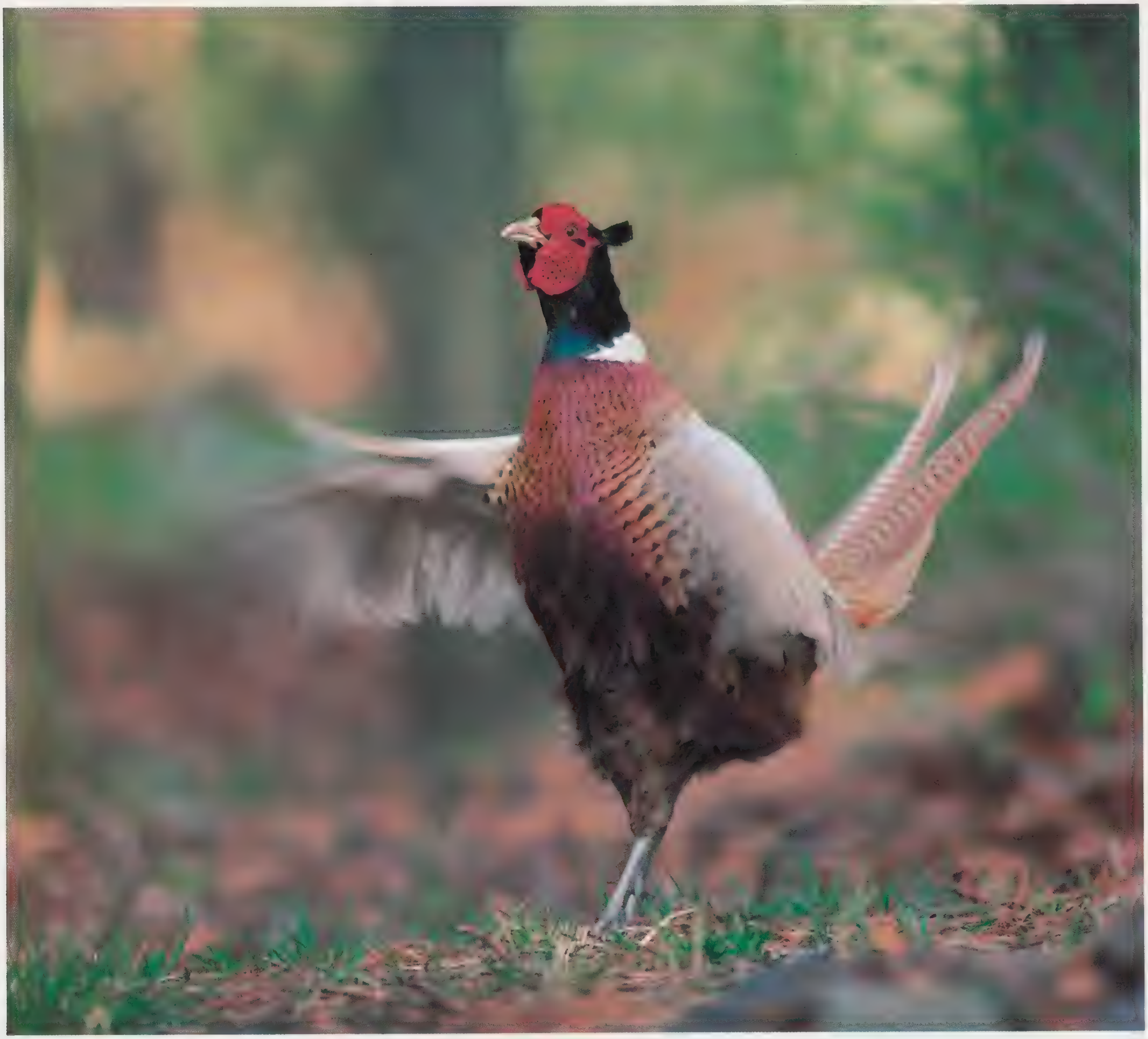
A few weeks after the male crowed in our field, we witnessed him displaying to a female. The incident occurred near the cracked corn we had thrown on the ground to attract the pheasants. The male positioned himself in front of the female with his right side facing her. Then he fanned and tipped his tail toward her, lowered his right wing to the ground, tucked in his head, and swelled his red wattles to twice their normal size. In response the female ran away a few steps. The male again confronted her and repeated the display. This is called the lateral-display and is a major part of ring-necked pheasant courtship.

If a male has no territory, he may become a floater, sneaking through others' territories and mating with another male's mate.

During courtship the male guards his harem in the early morning and late afternoon when the females feed. During midday, they leave him and individually construct their nests and lay their eggs. The nest is just a scrape in the ground lined with grasses, and it is often placed in fields of lush vegetation. The female lays from 6 to 15 eggs, older birds generally laying more than younger birds. Interestingly, female pheasants occasionally lay eggs in the nests of other species, such as ruffed grouse, bobwhite, and blue-winged teal. No one knows why they do this.

After mating and protecting

ROY MORSCH (BRUCE COLEMAN INC.)



the hen through the egg-laying phase, the male has no part in raising the young. And once his females are incubating, he no longer defends his territory from other males. The female incubates for 24 days, leaving the nest about an hour each day to feed.

Our next glimpse of the pheasants came in late June, when we were mowing our field. We found a pheasant nest with all of the eggshells neatly cut in half, indicating that the chicks had pecked their way out of the eggs. A few days later we were lucky enough to see the female cross our driveway followed by 10 baby pheasants.

For about two-and-a-half months the female cares for the young. After that they are independent. In early fall, pheasants move to areas of dense cover and remain there throughout the winter in small all-male or all-female groups. In early spring the males become more aggressive toward each other, start to crow, and disperse to their breeding areas as the cycle continues.

Rarely will you get a long, uninterrupted view of ring-necked pheasants, for the birds are wary and usually remain under cover. Nevertheless, in many locations they are common enough so that you can catch glimpses of them throughout the year. We hope you can now begin to piece together your observations and gain a greater understanding of this fascinating bird.

—Donald & Lillian Stokes

Blob or Bird?

Next to a field guide, binoculars are the most important piece of equipment in the birder's kit. They are the link between your eyes and the distant object of fascination. All too often, though, the binoculars birders carry into the field should have been trashed before Galileo filed for a patent. I am convinced that the greatest obstacle beginning birders face is not lack of knowledge or unrefined birding skills, but poor optics.

Here's the scenario. It is replayed at every nature center in North America every Saturday morning in spring.

At the head of the pack is the (gasp, sigh) field trip leader, bearer of the 10× German Uberglass (that he bought instead of a house). Trailing behind, the birding faithful, armed with an eclectic assortment of optical hardware ranging from vintage Bausch and Lomb 7×35 Zephyrs (that haven't been back in the shop since Japan surrendered) to the sponge-covered techweenie wonder that comes complete with magic whistle, secret decoder, and adoption papers.

About halfway to nowhere, the field trip leader raises his binoculars to the top of a tree a quarter mile away and proclaims, "Chipping sparrow. Look for the streaked back, rusty cap, black line through the eye, gray underparts, double wingbars."

Pandemonium and frustration reign. Most of the group can't locate the tree, much less the bird. The person with the vintage B & Ls can't make out a thing through the applesauce stain on the left objective. An individual with a pair of 7–15× zoom binoculars has them cranked to MAX and, given a field of view that wouldn't do justice to a medium-length soda straw, couldn't locate the Gulf of Mexico from an offshore drilling rig. Several people with over-the-counter bargain-basement bins can't understand why the leader hasn't commented on the bird's overall yellow color . . . and, "Oh, wow, look, the aurora borealis!"

Except for a handful of people who, like the leader, are shareholders in Teutonic Optics, Inc., or have upper grades of Bushnell, Swift, Nikon, and several other quality-conscious companies, nobody can see anything but a little bird on top of a tree.

"What's all this stuff about eyelines and wingbars? I can't see anything but a little dot. What's wrong with me?"

STEVE CARVER

Beginning birders don't have the background to focus on the root of their problem—inferior optics. All they know is that everybody is seeing field marks except them.

To digress for a moment, nobody can actually see eyelines and wingbars at a quarter mile—not even the field trip leader. The identification marks he is shouting with confidence are being enumerated for the benefit of the troop. Just because you can't see them doesn't mean they aren't worth reviewing. The actual identification was made by the bird's call.

But the point of this is simple: seeing birds well offers greater enjoyment than seeing birds poorly, and the better the optics, the more pleasure you will derive. Particularly for beginners, the better the optics, the less frustration you will encounter during your break-in period.

The rule of thumb is—buy the best glass you can afford and do it sooner rather than later. In my experience no single binocular is best suited for all types of birding. For great entertainment on a dull pelagic trip or a slow day on the hawk watch just state categorically that "X" is the finest birding binocular, and watch the fur fly. Ah, the arguments of experts are endless!

Look at what accomplished birders are using. Ask for a peek. You'll make a field trip leader's day if you ask for his advice. And later, when you're better armed, you can call his bluff and find out whether he really is seeing wingbars on a chipping sparrow a quarter mile away. —**Pete Dunne**

You May Be Less Than 10 Miles from a National Audubon Society Christmas Bird Count

Do you want to a) have fun, b) see lots of neat birds, c) contribute to our understanding of bird populations? Even if you don't know a finch from a flycatcher (and certainly if you do), you can participate in this winter's Christmas Bird Count, coordinated by the National Audubon Society's *American Birds* magazine, for a nominal fee.

If you don't know a thing about bird identification, tell your CBC leader and you will be assigned to a group with an experienced birder. If you don't want to go outdoors, you may be able to count birds at your own backyard feeders.

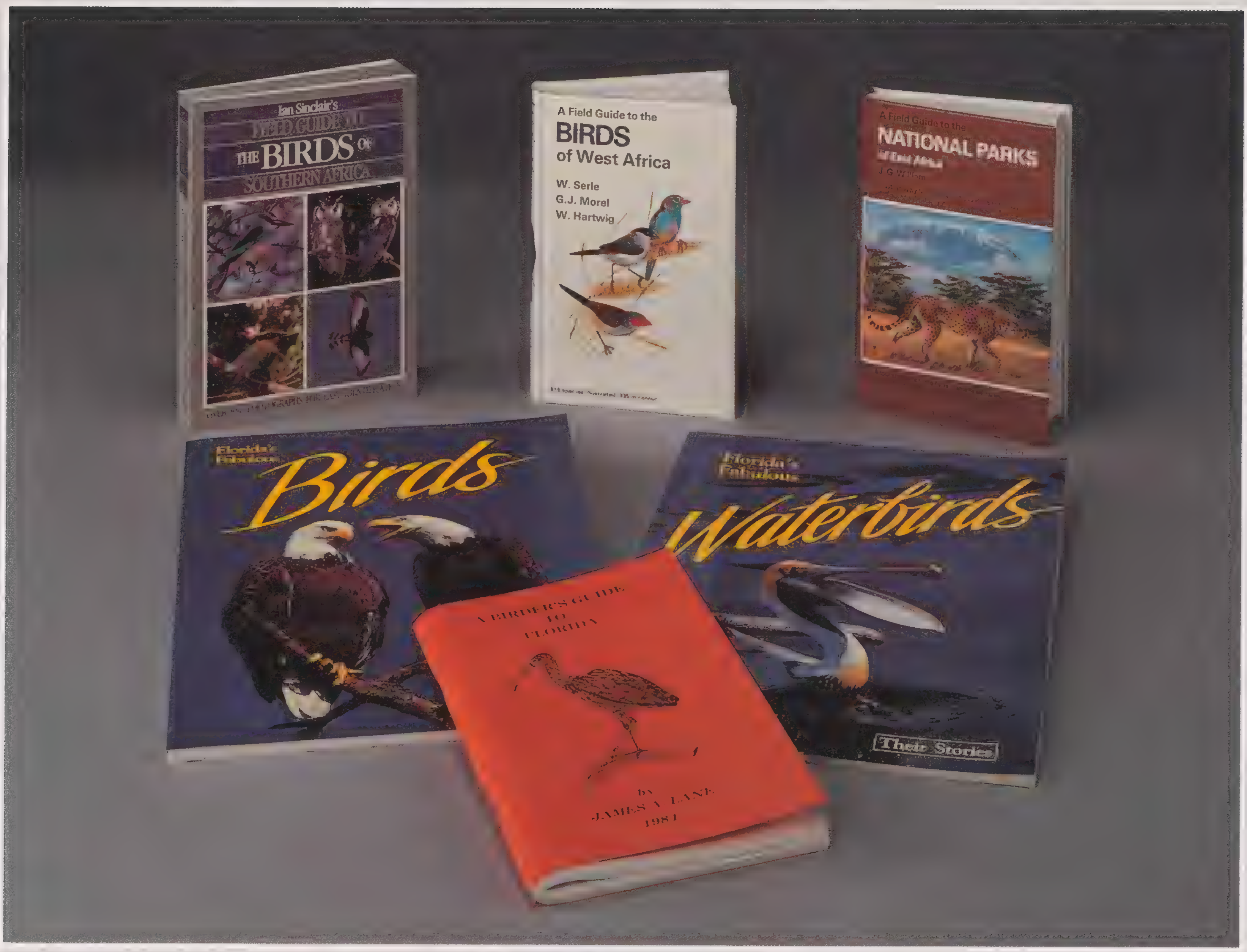
There are 1,500 CBC circles in North America, with over 40,000 participants. To find your nearest CBC circle, call or write to your local Audubon Society chapter, or *American Birds*, 950 Third Avenue, New York, New York 10022, (212) 832-3200, and they will help you contact your nearest CBC leader.

Your count will be held on one day between December 17 and January 3. Tallying and hot grog often follow. No excuses this year. Go out there and count the birds. Try it, you may get hooked!

THE LIVING BIRD

Quarterly

Winter 1988


Ian Sinclair's
FIELD GUIDE TO THE BIRDS OF SOUTHERN AFRICA
A Field Guide to the
BIRDS
of West Africa
W. Serle
G.J. Morel
W. Hartwig
A Field Guide to the
NATIONAL PARKS
of East Africa
Florida's Fabulous
Birds
Florida's Fabulous
Waterbirds
Their Stories
A BIRDER'S GUIDE TO FLORIDA
BY
JAMES A. LANE
1984

WILD WINTER ESCAPES
FROM THE CROW'S NEST BOOKSHOP

A FIELD GUIDE TO THE NATIONAL PARKS OF EAST AFRICA
J. G. Williams

A must for any birder planning a trip to the parks, reserves, and sanctuaries of East Africa. Covers Kenya, Tanzania, and Uganda. Describes park features and mammals and birdlife, including plumage, vocalizations, and distribution for many bird species. Contains 289 color and 64 black-and-white illustrations, and 25 maps. 1981, cloth, 336 pages.

No. 82069 $24.95/members $22.45

A FIELD GUIDE TO THE BIRDS OF WEST AFRICA
W. Serle, G. J. Morel, and W. Hartwig

Excellent field guide that covers the entire West African region bordered by Chad on the east, the Congo River on the south, the Atlantic Ocean on the west, and the Sahara on the north. Contains illustrations and extensive descriptions of more than 500 species, including plumage, voice, habitat, nests, and eggs. Also contains brief descriptions of 200 less common species. 1977, cloth, 351 pages.

No. 82150 $24.95/members $22.45

FIELD GUIDE TO THE BIRDS OF SOUTHERN AFRICA
Ian Sinclair

Headed for a South African safari? Here's a book that uses full-color photos to identify more than 900 bird species occurring from Antarctica to the Zambezi River. Also includes detailed range maps and short descriptions of the birds' plumages, habitats, and calls. 1984, paper, 361 pages.

No. 82181 $14.95/members $13.45

FLORIDA'S FABULOUS BIRDS
Winston Williams

Entertaining and stunningly photographed presentation of more than 120 land birds commonly seen in Florida. Contains hundreds of facts and explanations of topics such as courting displays, nesting activities, food sources, song, and territorial defense. Will be enjoyed by any bird-watching visitor to Florida. 1986, paper, 88 pages.

No. 82003 $10.95/members $9.85

FLORIDA'S FABULOUS WATERBIRDS
Winston Williams

A companion guide to *Florida's Fabulous Birds*. 1983, paper, 64 pages.

No. 82355 $8.95/members $8.06

A BIRDER'S GUIDE TO FLORIDA
James A. Lane

This book is guaranteed to help you find interesting birds while traveling in Florida. Organized by region, it includes maps and detailed directions to the best birding areas. Also tells what months are best for seeing individual species and gives tips on finding some of Florida's less common birds. 1984, paper, 160 pages.

No. 82022 $7.95/members $7.15

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THE LIVING BIRD *Quarterly*

Cornell Laboratory of Ornithology Winter 1988 Vol. 7 No. 1

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Front Cover: Tim Fitzharris photographed this yellow-billed stork while touring Kenya on assignment for *The Living Bird Quarterly.* His trip, made possible by a generous donation from Lab member Larry Wales, unfolds in word and picture beginning on page 10.
Back Cover: Sometimes feeding birds can be a heady experience. Photo by Richard Kalvar, Magnum Photos, Inc.
Right: Squacco heron by Tim Fitzharris.

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The convulsive vehicle, the nasty potholes, the bad drivers, the 110-degree temperatures, the sweat streaming past the eye. And the infinite waves of pink birds enveloping you in an ocean of pink.

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Humans build electrified fences, but how do gulls royally boot each other out of occupied territories? Researcher Hayward observed, recorded, experimented, and discovered the mew and choke of it.

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JUDITH McINTYRE

Laurence Alexander with sick loon

Newsbreak: Loons

With three more winters under our belts, I am writing to give an update on the winter loon situation here on the Gulf coast of Florida. As you may recall in my article in the Spring 1985 issue ("Trouble with Loons"), I told of the thousands of common loons that had died and washed ashore during the winter of 1983. The birds were emaciated, anemic, and had high levels of mercury in their blood.

In 1986 loons were still dying by the hundreds. Yet, as in 1983, more abundant fish-eating birds—mergansers, cormorants, pelicans—were not being affected. Mercury pollution is seriously damaging winter loon populations on the Gulf coast. It is imperative that more studies begin in other locations so we can determine whether populations elsewhere are also being affected. Only then can we learn where the mercury is coming from and perhaps take steps toward removing it from the environment.

Laurence L. Alexander
Florida State Museum
Gainesville, Florida

Booby Dept.

In the Summer 1987 issue, page 17, you state: "The northern gannet, *Sula bassanus*, is the only member of the booby family that lives in the northern hemisphere."

A quick check of *The A.O.U. Check-list of North American Birds*, sixth edition, shows that three other species of booby live in North America and on nearby islands. Of course, all of North America lies within the northern hemisphere. And there may be other species of boobies on other continents which live north of the equator as well. Did you mean to say "the only member of the booby family that lives in the *northern part* of the northern hemisphere"?

Allen M. Thomas
Deland, Florida

Our ornithologists have delved into The Sulidae: Gannets and Boobies *by J. Bryan Nelson, and have found that the northern gannet has the most northern distribution of all the boobies, but four other species—the masked, blue-footed, brown, and red-footed boobies—do indeed live in the northern hemisphere. Thanks for correcting us!*

From the Fan Belt

The Summer 1987 issue was outstanding. I especially appreciated Michael Harwood's article about Arthur Cleveland Bent. Like Mr. Harwood, when I'm intrigued about a bird or its activities, I go to Bent's *Life Histories* for information. And the intriguing titles of all the other columns and articles were enticing invitations to read them. All were excellent!

I think *The Living Bird Quarterly* is the best of all the bird magazines that I receive. It is beautiful, informative, and interesting.

Mrs. George W. Blaha
Cedar Mountain, North Carolina

Just a quick note to tell you that I got worried after reading the letter in the Summer issue from Chris Siddle, who feels that *The Living Bird Quarterly* should be transformed from a slim magazine into a thicker, more substantive publication.

To me the magazine is just about perfect. I love birds, and I'm an avid backyard bird watcher. *The Quarterly* is just enough for me since I am interested not only in birds but in wildlife in general, so I have many other things to read. And don't ever stop printing those wonderful pictures!

Ingeborg Fasse, M.D.
Boerne, Texas

FROM THE DIRECTOR

Sponsoring bird watching trips to faraway places is a tradition here at the Laboratory. During the past five years participating Lab members have journeyed to Africa, Australia, Burma, Thailand, the Galápagos, and numerous places in between. These trips have been organized by a variety of tour companies that have done an outstanding job of arranging the details of travel, accommodations, and leadership. The Lab's role has been to ensure that the tour companies are providing high-quality experiences and that the tour leaders are excellent birders with proven track records. Sometimes we've been able to send one of our staff members along, too. In fact, a few years ago my wife and I participated in a wonderful Lab-sponsored trip to the parks of Kenya. And last year, Greg Budney of our Library of Natural Sounds helped lead our tour to Africa.

In recent years our trips have become increasingly popular, and more and more tour companies have asked to work with us. We've been pleased to see such interest because we want to provide a wide range of birding experiences for you. But this year we realized that we can no longer sponsor all the tours proposed by various tour companies.

Therefore, we've changed the Lab's tour program. Each spring we'll solicit ideas for trips from various tour companies. Then, Lab staff will examine the proposals to determine which tours we will offer during the upcoming year. We'll select tours that provide a range of travel possibilities both near and far, and we'll work closely with tour companies to ensure that leaders are well qualified and that itineraries are well planned. On some tours a member of our staff will act as an assistant leader and Lab representative.

Finally, we'll prepare a brochure describing all the tours offered during the upcoming year. We'll mail the brochure in the fall, and it will contain a form that you can return for more detailed information about specific tours. You should already have received our 1988 tour brochure. If you haven't, you can request one from our tour coordinator, David Blanton, by writing to him here at the Lab.

From Argentina to Tanzania, we have lots of exciting tours planned. I hope you'll join us!

CHARLES WALCOTT, Executive Director

The white pelican has been taken off the threatened species list in Canada. The bird was placed on the list in 1978 after its Canadian population had dropped to fewer than 15,000 breeding pairs. The decline was caused by massive reproductive failure that resulted when huge numbers of pelicans began to abandon their nests each year after being harassed by fishermen who believed that the pelicans competed with them for fish.

In 1984 the Canada Life Assurance Company, an insurance firm that has used the pelican as its corporate symbol for 140 years, paid for a public information program in Manitoba and Saskatchewan which helped convince people to stop bothering the birds. As a result fewer pelicans now abandon their nests, and the population has bounced back to an estimated 50,000 pairs. This is the first time in history that a Canadian wildlife species facing extinction has recovered to the point where it could be taken off the danger list.

The Bolivian government recently agreed to protect nearly four million acres of its tropical rain forest in exchange for a reduction in its foreign debt. Conservation International of Washington, D.C., a new nonprofit organization, purchased $650,000 of Bolivian debt in exchange for the country's agreement to set aside 3.7 million acres in the Amazon Basin. The newly protected area is home to 500 species of birds, more tree species than exist in all of North America, and 13 endangered species including various cats and monkeys.

Conservation International purchased the $650,000 debt for only $100,000 from banks eager to dump the mostly uncollectable loans. Conservationists hope the idea will catch on in other Latin American countries where rain forests are being cut at alarming rates. Ecuador and Costa Rica have already indicated interest in similar deals.

A new species of parrot was tape-recorded last summer in Peru by Anthony Meyer of Victor Emanuel Nature Tours and Lewis Kibler, Laboratory of Ornithology Associate. The bird had first been photographed last year by Charles Munn of the New York Zoological Society, and specimens had previously been collected by John O'Neill and colleagues at Louisiana State University's Museum of Zoology.

The bird, which has not yet been officially named, appears to belong to a group of parrots commonly called parrotlets. These are small, green birds that often fly in flocks and are more easily heard than seen. Comparing the recorded sounds of the bird with the sounds of other parrotlets should help scientists determine the species to which it is most closely related.

Kibler's recording has been archived in the Lab's Library of Natural Sounds, and copies have been sent for analysis to researchers at the New York Zoological Society and Louisiana State University.

AROUND THE LAB

James Gulledge, director of the Library of Natural Sounds since 1974, retired last fall. During his 13 years at the Lab, Jim transformed a small, disorganized accumulation of recordings into the largest and most diverse collection of natural sounds in the world. He produced seven different commercial records or tapes, from "Warblers of North America" to "Voices of the Peruvian Rainforest." And he helped the Library become an important source of information on recording equipment and techniques.

Jim was honored with a special presentation during the Lab's fall banquet. He plans to stay in the Ithaca area and to maintain close contact with the Library while pursuing other professional interests.

Join us this summer for two exciting Laboratory-sponsored field courses: Natural Sound Recording and Bird Population Studies.

Natural Sound Recording, offered June 11–18, is a unique course that will teach state-of-the-art techniques for recording sounds of wildlife through many hours of hands-on experience. The course will be held at San Francisco State University's Sierra Nevada Field Research Station in the Tahoe National Forest, California. Topics will include selection of recorders and microphones, recording theory and technique, metering, and documentation of recordings.

Bird Population Studies will be offered June 19–25 and will provide hands-on instruction in bird censusing. The course will be taught at the Institute of Field Ornithology in Machias, Maine. Participants will learn how to contribute to various large-scale bird censusing projects that use volunteer observers throughout North America. Classwork will involve identifying birds by voice, finding bird nests, and observing breeding bird behavior. Two undergraduate credits are available for this course through the University of Maine at Machias.

Cost for Natural Sound Recording is $495 and will include all food, lodging, class materials, and instruction. Cost for Bird Population Studies is $395, which does not include food, lodging, or undergraduate tuition. Course enrollment is limited and available on a first-come, first-served basis. See inside wrapper of this issue for further information and enrollment application, or contact Greg Butcher (Bird Population Studies, 607-255-5056) or Greg Budney (Natural Sound Recording, 607-255-5056).

Bequests for Birds

Bequests are playing an increasingly important role in ensuring the long-term success of the Laboratory's projects. In 1987 we received bequests of $150,000, which have been added to the Lab's building fund and operating endowment, allowing us to add much-needed space onto the Lab building and increasing our long-term financial stability.

Members and friends are encouraged to consider this means of making a gift to the Laboratory. A bequest will make your interest in birds and the Lab live on and on.

For more information about how you can use your will to make a gift to the Laboratory, please contact: Scott Sutcliffe, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607) 255-5056.

The Innovator

I'll bet that 99 percent of American birders under the age of 60, though they benefit regularly from his work, cannot identify our Mystery Subject from the following clues:

He was the first important American bird photographer—a pioneer, starting in the 1880s, whose example and instruction inspired many birders to go and do likewise.

He was a founding director of the National Association of Audubon Societies and served on the Audubon board for 32 years, many of them as chairman.

Among the 17 books he wrote was a bird guide so valuable that it was still in print more than 70 years after the first edition was published.

He pioneered in the study of Central and South American birds, and wrote massive volumes on the birds of Colombia and Ecuador.

He founded and for 36 years edited and published the magazine *Bird-Lore*, which became the cornerstone of two great nature magazines, *Audubon* and *American Birds*.

These are the accomplishments of one individual, I promise. In fact, that short sketch doesn't do justice to his accomplishments. If this list isn't enough to catapult his name into your consciousness, that only goes to show how fleeting is fame, even for someone our generation would call a "superstar" of American conservation and ornithology.

Frank Michler Chapman would have been a leader in any field of endeavor. One of his contemporaries remarked, "Throw him penniless on Broadway and in 10 years he would own both sides of the street!"

Born in Englewood, New Jersey, in 1864 and educated mostly at Englewood Academy, Chapman went to work in the American Exchange Bank of New York City at the age of 16. However, as he wrote in his autobiography, an "intense interest in birds" had been "my distinguishing characteristic" since boyhood. Before he was 20 he had participated in a nationwide study of spring bird migration, and the exceptionally high quality of his report attracted the attention of Dr. A. K. Fisher, a founder of the newly organized American Ornithologists' Union. Fisher became Chapman's mentor and sponsored him for election as an associate member of the A.O.U.

Bird protection was a major concern of the A.O.U. founders because many kinds of birds, birds by the barrelful, were being shot year round for food and for sport and to provide plumes and colorful stuffed ornaments for ladies' hats. Chapman's first major contribution to that aspect of ornithology was a typically novel one, which is frequently cited by historians of conservation: He took a couple of afternoon strolls along 14th Street in New York, surveying the identities and numbers of the stuffed birds and bird parts he saw on bonnets, and published the results. Forty species were represented, including pileated woodpecker, green-backed heron, and Virginia rail.

In short, he had found his calling, and at 22, soon after he had been made a department head in his bank, he resigned to spend his life as an ornithologist—despite the fact that, as he said later, "ornithology as a profession in this country was almost unknown" in 1886. The Chapman family resources were such that his widowed mother could afford to support him if necessary, but after a few months on his own he was hired at the American Museum of Natural History in New York, where he continued to work—eventually as curator of birds and then as chairman of the bird department—until he was 78.

With the museum as his springboard he began to travel widely in the Americas, collecting, studying, and photographing birds. Photography gave him an ample arena in which to exercise his remarkable inventiveness. For example, his first camera, loaned to him by a friend, had no shutter; one made an exposure by removing the lens cap for a while and then replacing the cap. Chapman rigged a shutter with a rubber band and pieces of a cigar box—and it worked. He experimented with blinds from which to make bird photographs, and for those occasions when building a blind wasn't appropriate he devised a shutter release triggered by a bicycle pump, so he could operate his camera by "remote control" from behind nearby vegetation. Later in his career, in the jungles of Panama, he trip-wired his camera so that passing animals would photograph themselves.

As soon as he was established at the museum he made it a "bully pulpit" (to borrow a phrase from his friend Theodore Roosevelt) from which to help organize the American bird-protection movement and educate the public about birds. In those days, said Chapman, the "prevailing ignorance of bird-life" was one of the main problems in conservation. "How could we hope to arouse an interest in creatures, many of which were unknown even by name?" So, to improve the common knowledge of American birds and encourage public interest in ornithology, he wrote the *Handbook of Birds of Eastern North America*, first published in 1895 and revised several times in the next 44 years. He followed it with *Bird-Life, A Guide to the Study of Our Common Birds* in 1897, *Bird Studies with a Camera* in 1900, *Color Key to North American Birds* in 1903, *The Warblers of North America* in 1907, and *Camps and Cruises of an Ornithologist* in 1908. One gets the feeling that Chapman came into the world with a pen permanently attached to the thumb and first two fingers of his right hand; he wrote constantly—journals, notes, articles, papers, monographs, books.

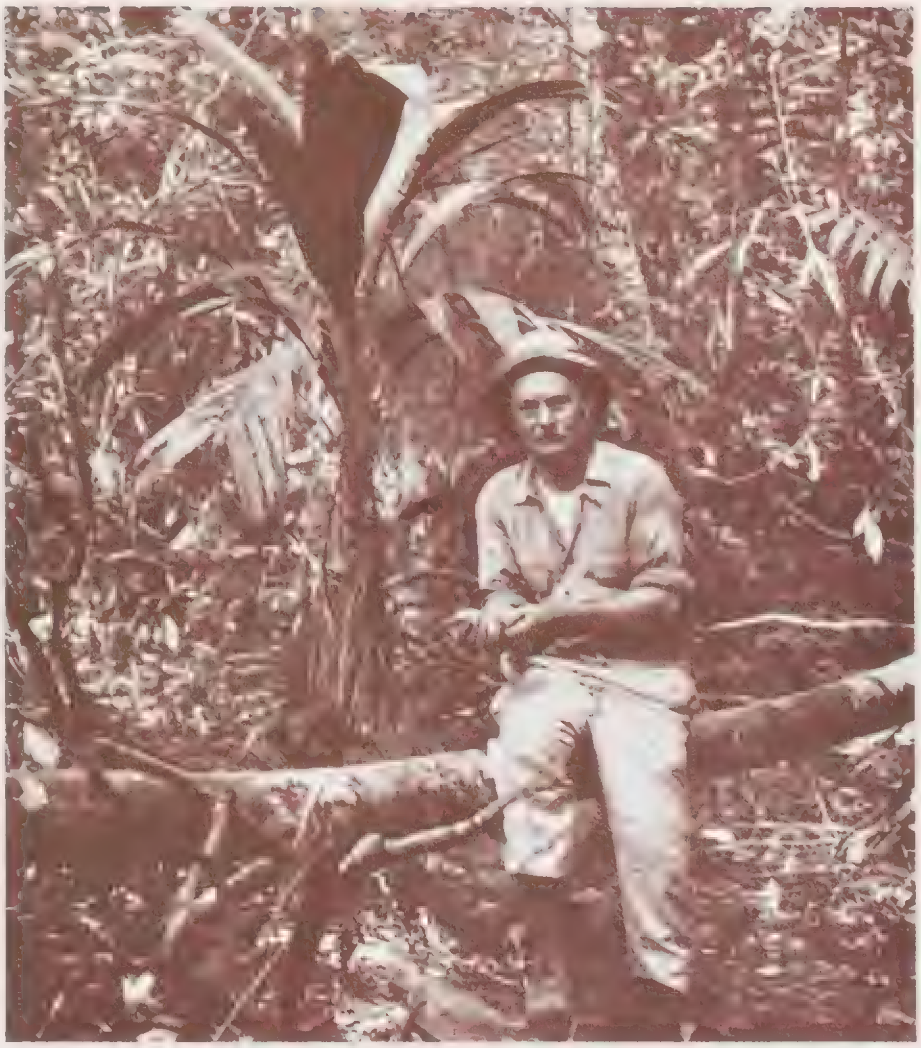
Meanwhile—"meanwhile" is a key word in any Chapman biography because he did so many things in parallel—he was designing exhibits at the museum, which also were aimed at conservation education. First he created a display of the birds of the New York City region, an array of stuffed specimens that was changed at appropriate times to match the seasons. That may sound like a pretty basic idea, but it was a new one then for the museum.

However, the trouble with

stuffed birds is that they tend to stand there looking like stuffed birds. Chapman sought to show bird specimens in ways that, contrary as it may seem, breathed life into them. "I wanted to bring into our halls the illusion of outdoors and, by placing the bird in its own setting of land or water, vegetation and air, retain its charm as one of the most beautiful of animate creatures, at the same time showing its characters in relation to its haunts."

He developed the idea of "habitat groups," in which North American birds were posed in action in foregrounds of carefully fabricated plants or other realistic micro-environments that blended, as unobtrusively as possible, into spacious, well-painted backgrounds. In its fully developed form, Chapman wrote, the exhibit's back wall, where the setting is painted, "is curved, its top and sides concealed, the light comes wholly from above. . . . One seems to be looking through a window on nature itself."

He had strict rules about the settings. "Never must truth be sacrificed to beauty. The background should realistically represent a definite place and be as accurate a lesson in geography and physiography as the group itself is in zoology and botany. Nature offers a sufficiently wide range of subjects to permit us to select one that, without alteration, will meet the requirements of both science and art." He made certain of the veracity—and the beauty—by personally photographing settings from the Caribbean to California, by overseeing the creation of the exhibits, and by choosing exceptionally talented nature artists to paint the backgrounds, among them Louis Agassiz Fuertes.



The Innovator in 1926 on Barro Colorado Island, Panama.

Courtesy Department of Library Services, American Museum of Natural History. Neg. no. 123307.

He loved the opportunity these exhibits gave him to be among birds. He once chased all the way to the Bahamas to photograph a flamingo nesting colony. After much fruitless trudging, he at last found one. It contained 2,000 gloriously pink, long-legged birds, and having watched for a while from his blind at the edge of the colony, he wrote, "I was tempted to step out . . . and address a word of triumph to the assembled multitude." Then he moved the blind to the center of the colony and sat on a deserted nest within arm's reach of the nearest incubating birds. "I was engulfed in color and clarionings. The wildest imagination could not have conceived of so thrilling an experience. Seated on the deserted nest, I myself seemed to have become a Flamingo."

As he developed the habitat-group concept, Chapman also raised the money to finance preparation of his exhibits; he had a talent for fundraising, too. He devoted more than a decade to this enterprise, and when he moved on to other projects he had established a genre that would be copied by museums all over the world.

Meanwhile he had been elected chairman of the board of the newly organized New York State Audubon Society as well as associate editor of *The Auk*, the journal of the A.O.U. He had founded and was editor of the bimonthly magazine *Bird-Lore*, which quickly became the official publication of various state Audubon societies. He had helped create the National Association of Audubon Societies, which also made *Bird-Lore* its magazine. Through *Bird-Lore* he had introduced the Christmas Bird Counts. He had been appointed curator of birds at the museum.

In 1911, his 48th year, with achievements already worthy of two careers, he made an expedition to Colombia. At the time, few American ornithologists had done much work in Latin America. Europeans had long dominated bird study there, and the best collections of South American bird specimens were housed on the far side of the Atlantic. "In view of the close relations existing between many North and South American birds," wrote Chapman, "and because of the bearing of these relations on the problems of their origin, distribution and migration, it seemed obvious that we [Americans] should not be obliged to go abroad to study the birds of our own hemisphere." He set out to build a major collection of South American birds at the museum.

With the help of many other collectors he accomplished that. Once in Colombia, however, Chapman also became fascinated by the question of life zones—the fauna and flora found at different altitudes. As he crossed the Andes for the first time he was struck by the distinct boundaries he found in vegetation and birds at various altitudes. "I have passed, on foot, from one zone to another and experienced an almost complete change in bird-life within five minutes," he wrote.

This offered great possibilities for fruitful scientific inquiry. The Andes, Chapman believed, were an ideal region in which to study questions of bird evolution and distribution. His contribution to the effort, which he produced over the next 15 years, was a pair of 700-page volumes on the distribution of birds—one about Colombia and one about Ecuador.

The trouble with stuffed birds is that they tend to stand there looking like stuffed birds.

Before the second of those works was published, Chapman was off on two more projects. A large exhibition hall in the museum became available to him and he set out to fill it with habitat groups from around the world. The crowning glory of the hall was an aerial habitat group—ducks, geese, pelicans, an albatross, a condor, and others—in flight beneath a domed sky painted by the then obscure artist from Minnesota, Francis Lee Jacques.

Chapman couldn't explore the whole world for the sake of these exhibits the way he had explored North America, but he did do some of the collecting. While in Panama on such an errand, he made his headquarters at the biological station on Barro Colorado Island in the canal and fell in love with the spot. "I found a home in a primeval tropical forest," he wrote, "where, undisturbed, I could live on intimate terms with its birds and beasts. . . . I determined now to devote myself as intensively to a study of the habits of tropical birds as, in the preceding years, I had to their distribution and origin." A small house was built for him at the station, and he spent three or four months a year there for the next seven years, watching birds and mammals and exploring the ecology of the island. Out of this came articles, two important monographs, and two popular books.

Meanwhile he had become chairman of the board of the National Audubon Societies. He had served as president of the A.O.U. The museum had created a separate department of birds and had made him its chairman. He had collected a raft of awards and prizes for his scientific, conservation, and literary work.

In his 70s he retired from the museum and the Audubon board and turned over *Bird-Lore* to the association. But his mind and energy were still engaged. In 1942, the year he left the museum, a friend dropped into Chapman's office there. "Well, well—come in and join the fun!" Chapman said cheerily. "I'm working on a new book about the relations between birds and man. Doesn't it sound interesting? It's such a tremendously varied subject and I may never be able to finish it, but I'm having a perfectly marvelous time!"

When he died in 1945, the book remained unfinished. That's a pity. I would love to see his summary of the topic from the perspective of the end of his life. Earlier, he had had a very stern view of the matter. "Civilized man is Nature's worst enemy," he wrote in the 1890s. "He is a disturbing element whose presence is a constant menace to the balance of life." When the state of Florida belatedly passed strict laws against the killing of egrets for their plumes, he was not particularly comforted. "So, too, [Florida] has passed laws against pick-pockets, but just as long as there are pockets worth picking there will be someone to pick them, and just as long as Egrets' plumes are worth their weight in gold there will be someone to supply them, until . . . the last plume has found its way from the bonnet to the ash-barrel."

An exhibit at the American Museum—"I wanted to bring into our halls the illusion of outdoors by placing the bird in its own setting."

But perhaps man could change. A conservation revolution took place during Chapman's lifetime. The American public became bird conscious, to begin with. The period from 1895 to 1911, he noted, could well "stand as the Epoch of Popular Bird-Study," and the 20 years that followed them were "even more productive." This public interest was generated by a movement in which he personally played a number of leading roles—as writer, editor, photographer, administrator, lecturer, and scientist.

The movement succeeded in protecting egrets and all other North American birds from wholesale slaughter. Most of the carnage was stopped. The bird-protection movement then led to a larger movement for the protection of wildlife habitats where birds and other living things breed, feed, and rest. This in turn widened into the protection of human habitat and became the environmental movement.

With his far-ranging interests in biology, geology, and ecology and his ability to write and talk about those interconnected subjects for lay audiences, Chapman helped sow the seeds for all of this. Robert Ridgely, an ornithologist who studies the birds of Ecuador and not only depends daily on Chapman's scientific work but also admires him generally, recently summed up Chapman's impact very neatly: "We're all sort of standing on his shoulders."

—Michael Harwood

Queensland Is for Koalas... kookaburras, cockatoos, and honeyeaters

Photos: Australian Tourism Commission

1988 is the year of Australia—the most popular foreign destination for naturalists, bird watchers, and tourists.

Queensland has the most varied habitat in Australia—the Great Barrier Reef, lush tropical jungles, the outback, the great dividing range of mountains, and some of the most beautiful beaches in the world.

You'll spend time looking at birds, koalas, wallabies, and crocodiles in Queensland with MOT's leisurely tour, led by the past president of the Queensland Ornithological Society. You will snorkel in the Great Barrier Reef, overnight in the outback, boat in the tropical jungles of Daintree National Park, and stalk the Lyrebird and Crimson Rosella in the forests of Lamington National Park.

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Ahhhhh, Africa!

TEXT AND PHOTOGRAPHS BY TIM FITZHARRIS

Lesser flamingos. My assignment is pretty open. Get some great pictures of the birdlife in Kenya and be sure to visit Lake Nakuru, the place Roger Tory Peterson called the greatest bird spectacle in the world.

The assignment from my editor was pretty open. "I want some great pictures of the birdlife in Kenya, particularly from the flamingo lakes of the Rift Valley. And make sure to visit Lake Nakuru, the place Roger Tory Peterson has called the greatest bird spectacle in the world."

So early last January I land in Nairobi with Audrey Fraggalosch, my field companion and colleague. Our ride to the hotel previews the excitement in store for us. The taxi is a loose-jointed, brakeless affair laden with coats of white house paint. The driver's black face beams at us, his big teeth broadcasting good humor, "Relax friends, you are in the hands of a professional driver!" And with one hand on the horn he plunges us into the reckless maelstrom of Nairobi traffic. A while later we screech to a tire-burning standstill at the doorstep of our hotel.

As the bellhops scramble about our mountain of gear, our driver advises, "You must exercise great care when traveling the roads in Kenya. They are full of nasty potholes and bad drivers." (I silently promise myself to take his advice, especially if he's going to be on the road.) He folds himself back into the car and the taxi moves off, swallowed by a cloud of dust and flying gravel.

We lease a Suzuki jeep and load it with our tent, camping gear, photographic equipment, floating blinds, food and water, and 25 BIC lighters—presents for the Africans. If we get stuck, we just hop out and push. The jeep is small but extremely tough and maneuverable. It takes the bumps like india rubber, occasionally bouncing and bucking itself into convulsions until I can get it slowed down.

Our plan is to tour the major national parks and game reserves, spending a few days in each location. We're after the big exotic species—storks, herons, waterfowl, birds of prey, pelicans, and especially flamingos.

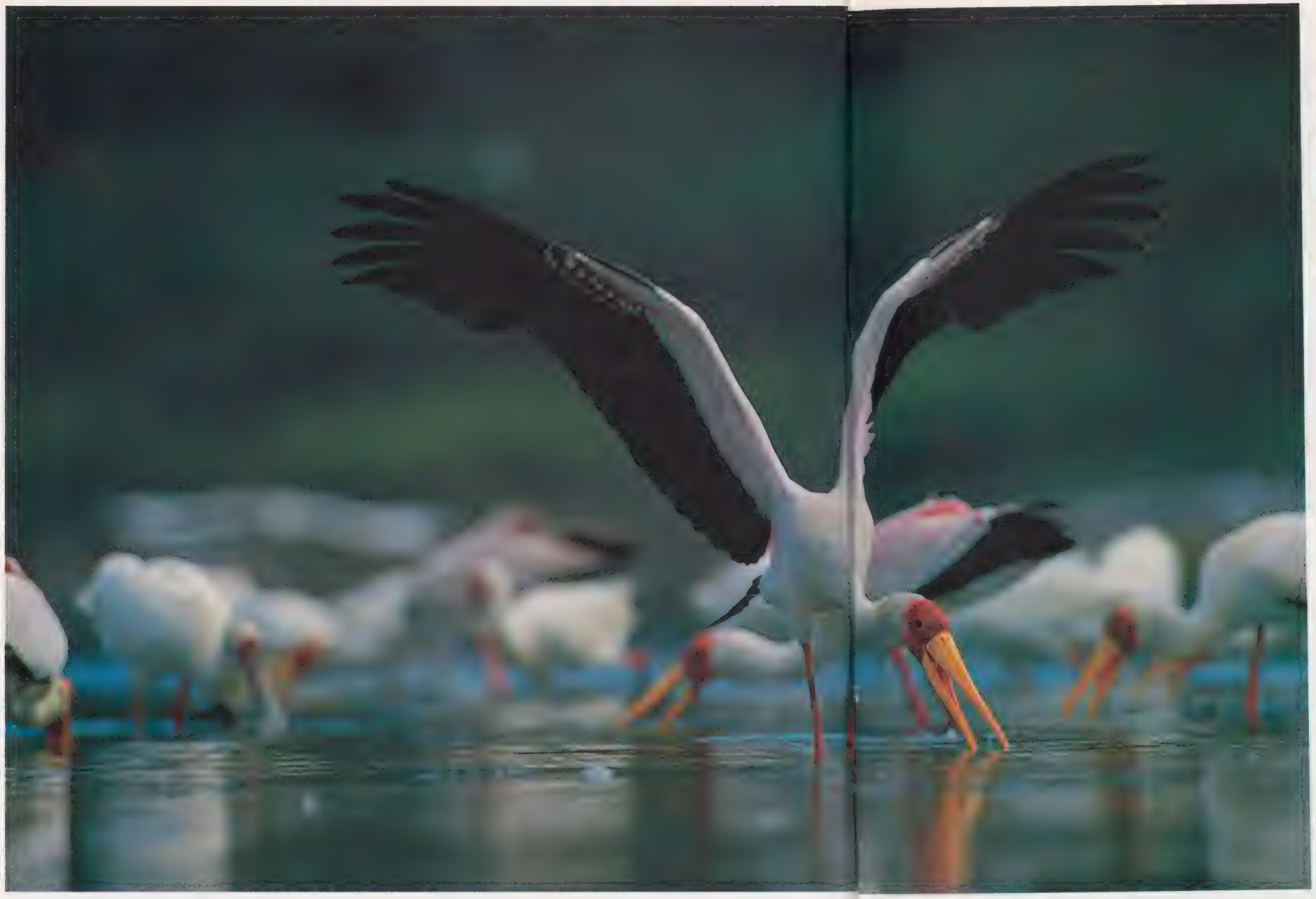
Our first destination is Lake Magadi, about 60 miles south of Nairobi. Typical of many of the Rift Valley lakes, the waters of Magadi are highly alkaline due to heavy concentrations of mineral salts resulting from extreme evaporation and low rainfall. These conditions support the growth of blue-green algae, the favorite food of the lesser flamingo. Over a million pairs of flamingos were discovered breeding on Magadi in 1962, and this small, blue splotch on the map seems an easy target for our first xenophobic thrust into the dark continent. We soon find out differently.

The drive is a macabre roam on another planet, a planet with a mixed atmosphere of dust and acacia wood smoke and a temperature of about 100 degrees. The highway is narrow and riddled with potholes. Africans line the shoulders, some of them driving goats or loose herds of cattle along the ditches. Pickup trucks converted to buses, ragged with dangling passengers, careen along this strip of moonscape, appearing to juggle the mounds of mattresses, bags, and crates poised on top. Except for the black government Mercedes that swoosh past, most of the vehicles cough and belch suffocating clouds of blue smoke.

Carefully skirting the donkey carts and stray livestock, we dribble southward, leaving the highlands of Nairobi behind. As we lose altitude the heat increases and the countryside changes from cultivated green to a parched thornbush gray-brown. We see our first giraffes, dappled slow-motion towers of muscle and twitching ears. The road begins to run out of people and soon the countryside is empty, frying in silence. Every few miles we skirt the acacia thorn enclosures and mud hovels of the Maasai, herdsmen who cling to traditional customs.

By now I'm overheated and stretched tight with excitement. My head buzzes from the insistent concussions from the road and the noise of the jeep. Once in a while my attention alights on a red dab moving through the shimmering curtains of ultraviolet. At last the dab takes the form of a Maasai boy, running barefoot across the barren scrub to rendezvous with the jeep. His cape, the trademark red of his tribe, flutters open, showing dusty genitals as he turns on the speed.

Once we stop for three Maasai girls hawking trinkets. They are cardboard poor. They lean into the jeep—wispy, slim, spilling a fearsome scent into our space. They whisper urgently in Swahili. We know what they want but understand none of the specifics. Their thin brown arms are snakes writhing into our gear, draping beads about our necks. We buy two necklaces and give them biscuits and a carton of milk. Then a yellow-eyed old woman with earlobes stretched almost to her shoulders pushes in. Her weathered reptilian body, sheathed in a clatter of beads and hoops and rotting fabric, heaves from running. She scatters the girls with truncated gestures



Far left: yellow-billed storks, scores of them, begin a rush of feeding, tumbling over one another in a big, jerky wave of sighing wings. The storks wait motionless for prey, bills vised open in the water. Near left: buffalo and red-billed oxpeckers. Below: Maasai girl. Unlike this rich one, those we meet are cardboard poor. They lean into the jeep—wispy, slim, spilling a fearsome scent into our space.

and blasts of hot breath. She gives us her sales pitch, shuffling through the dust alongside the jeep's open window. It's all too much for us, and being but a short distance from the lake, we decide to camp for the night and cool out.

By 10 o'clock the next morning the thermometer at the British-owned Lake Magadi Soda Company petrol station reads 110 degrees. Undaunted, we fill our gas tanks and water jugs and descend the last 10 kilometers into the caldron of Lake Magadi. An hour later I get into my floating blind and start toward a few thousand shimmering dots of pink and white. Flamingos at last. I feel at home in the familiar confines of my blind and grow excited about getting some good pictures.

But the big green lake turns out to be a wafer of warm goo. The blind bogs down. After half an hour, I have gone only a hundred meters and the flamingos seem to have moved farther off. The heat and exertion are melting my body. My chest waders fill with sweat. Sweat streams past my eyes, dams up in my beard, and drips off my chin and onto the little jumble of film cartridges waiting to be undressed in the camera. My head aches and my stomach is getting ready to turn itself inside out. Then for 200 exposures (about 10 minutes) I forget everything but what I see in the viewfinder.

Yellow-billed storks, scores of them, begin a rush of feeding, tumbling over one another in a big, jerky wave of sighing wings. The trough of this bird wave is still as the storks wait motionless for prey, bills vised open in the water, ready to scissor hungrily into the slime. The wave's fluttering crest brings more storks washing over the feeding birds, settling ever closer to my camouflaged position. In a few minutes the wave rolls over me, refreshing, whispering, intense. In the eddies of the wave of storks are African spoonbills, racing in tight little circles, chomping at the algal soup, making the same gobbling noises as their American cousins. I'm firing and reloading as fast as I can and all too soon the wave's energy sweeps on, spending itself in the distant shimmer. I stand up at last. I feel weightless, elated, joyous. The faintest stirring of wind fans the rivulets of perspiration gleaming over my face. Ahhhhh, Africa!

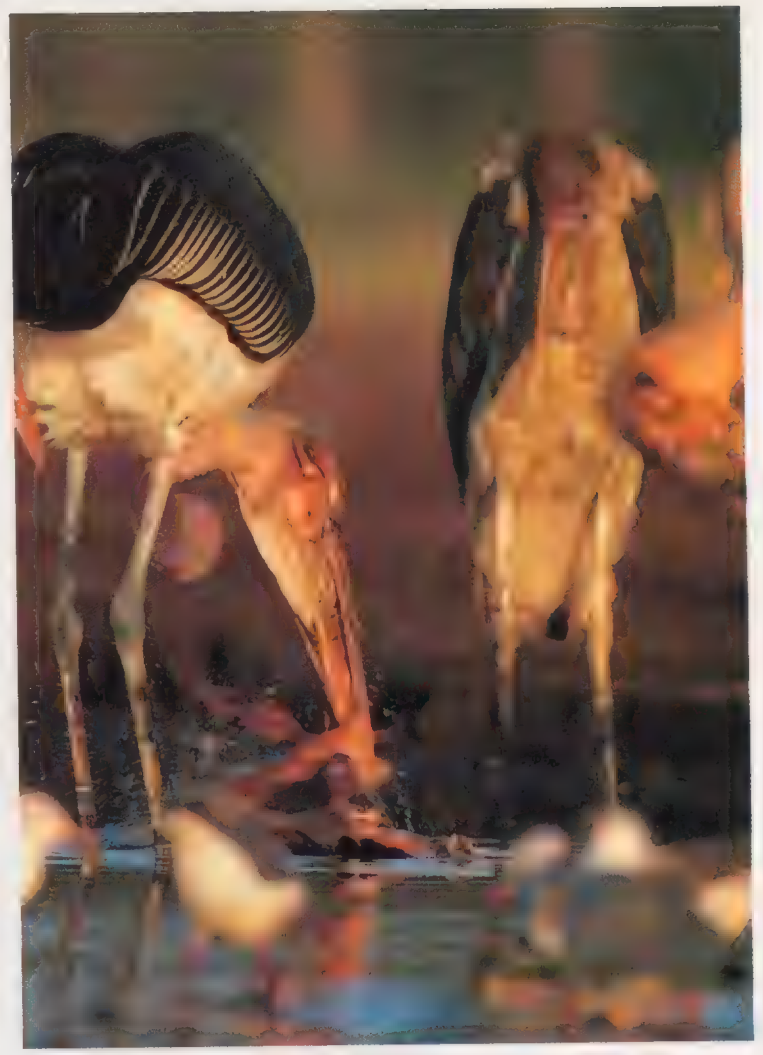
In the next few weeks we visit Amboseli, Maasai Mara, and Tsavo national parks. All of them lie along Kenya's southern border with Tanzania. We're saving Lake Nakuru, home of "the greatest bird spectacle in the world" until last. It lies north of Nairobi in central Kenya, one of a string of small lakes that dot the Rift Valley.

We're getting used to Africa, used to driving on the left side of the road, used to curry, samosas, and warm beer (brand name Tusker), used to getting lost, used to the big black and tan fingers of the park wardens slapping dreamily at our map sheets and at the little colored pictures in our *Field Guide to the Birds of East Africa*, used to the politeness and the curiosity, used to our routine: up an hour before dawn, shoot and drive for three hours, then bathe and eat and sleep and stay out of the sun until late afternoon, then shoot right till nightfall and feel our way back to camp with the headlights off lest the wardens spot us moving after dark. Used to an unending parade of strange birds, a fat Sears catalogue of species. I can only look and wish I knew what they are. There are too many for me to attempt identification. We concentrate on the species occupying marshes and lakes, and at night look up the ones I have photographed during the day.

It's not easy to get used to the nights. I lie on the ground with my head sticking out of our small tent, a dreamy 40-year-old papoose watching the stars. The southern heavens are packed with stars. You suddenly understand the old grammar school comparison of the number of stars to the number of grains of sand on a beach the size of Texas. The safety switches on the animals become deactivated once the sun sets—they are no longer hidden or quiet. Hyenas start laughing out loud. One of them walks into our camp and steals the toothpaste. A wart hog licks at a stack of dirty dishes, tearing fuzzy holes out of the dark until I probe after him with the flashlight and send his compact hooves patty-caking into the underbrush.

After sundown the hippos leave the marshes to graze around the camps. Gargantuas in gray sausage costumes, they work the grass near the tents most of the night, broad lips ripping the blades off in bunches with a sound like a short snore. Short snores outside our tent all night long. It's not easy being in the water with the hippos when I'm photographing marsh birds. They snort, splash around, and show their teeth. And there's a sarcastic lilt to their bellowing.

We stay at Lake Baringo for a week. Its water is fresh, not alkaline, and supports a variety of marsh birds. I get great shots of malachite and pied kingfishers, goliath herons, hammerkops, white-faced tree-ducks, jacanas, black-winged stilts, and spur-winged plovers, mostly close-up portraits. Here we relax for a few days, gathering ourselves for the last big fling at



On the sidelines are the marabou storks: out-of-work undertakers waiting for the next corpse, boozy tuxedoed gourmands with floppy sacs of stubbled skin hanging from their throats, trash pickers at the junkpiles of elegant flamingo skeletons.

Far left: lesser and greater flamingos and white pelicans. Near left: goliath heron. Below: hippo. Sweat streams past my eyes, dams up in my beard and drips off my chin and onto the little jumble of film cartridges waiting to be undressed in the camera. My head aches and my stomach is ready to turn itself inside out. Then for 200 exposures I forget everything but what I see in the viewfinder.

Nakuru. The lakeside lodge is filled with bird watchers from Europe, especially Britain. We lie around the pool and swap bird and animal stories over warm foamy Tuskers and Baringo Specials (one part pineapple juice, one part lime juice, one part rum, a dash of Angustura Bitters, garnished with fresh papaya, orange slices, and watermelon. Umm boy!).

There is very little in the way of music here, but one night we strap the walkman between our heads and dance out on the lawn to a Johann Strauss tape, just us and the hippos, belaboring a patch of grass with fancy African footwork. The next morning we're ready for the final push.

Roger likes pink. That's what the greatest bird spectacle in the world is. Miles of it. A thick undulating braid of pink that encircles blue Nakuru, an evanescent necklace made up of little pearls glowing in the white heat. Each pearl is a flamingo that filters green algae out of the top six inches of the lake by holding its head upside down below the surface, sucking in a mouthful of water, and then squirting it out through the strainers that line its beak. It scrapes off the residue with its tongue and swallows. This kicks off the cycle: ingestion, digestion, elimination. The relationship between these pink multitudes and the alkaline waters of Nakuru is beautifully simple.

The lake is trapped, immobile and stagnant in the Great Rift Valley, a giant, overheated petri dish that grows algae at a prodigious rate. The flamingos siphon it up and process it to fertilizer to keep the photosynthetic dynamo humming. Every few years some flamingos fly a short distance into Tanzania to their main breeding site. But by and large the birds stay in the dish—mindless, unimaginative, happy.

On the forest trail down to the lake, I develop a growing appreciation of the waiting spectacle. The trees seem to be pasted onto a wall of pink fog. A whispering rumble leaks through gaps in the understory, a sound produced by a hundred thousand resonating tracheas, fifty miles of heated tubing wrapped in feathers. I ride this cloud of bird sound down the trail. Water buffaloes, asleep in the close brush, lurch to their feet and stampede clear of the path. Suddenly the forest opens and I'm at the lake.

The beach feels like the carnival has just left town, a brown sweep of mud, packed hard by countless bony footsteps. The litter of feathers is everywhere, discarded ticket stubs flopping back and forth in the evening wind. Here and there are small, shapeless piles aswarm with flies—flamingo carcasses. A few are surrounded by broken circles of marabou storks squabbling over the muddied remains. Gray-headed gulls forage on the scattered scraps among the knobby marabou legs.

Hunched over one pile, an African fish eagle tears at its dinner, the fierce, wary center of a spreading array of pink petals. Waiting on the sidelines to clean up the eagle's leftovers are more marabous: out-of-work undertakers waiting for the next corpse, boozy tuxedoed gourmands with floppy sacs of stubbled skin hanging from their throats, trash pickers at the junkpiles of elegant flamingo skeletons. I love the marabous. The beach has a hundred or so within sight. I can also see several small herds of defassa waterbucks and a few solitary wart hogs sniffing around.

The flamingos are all out in the water. A sub-flock of a few thousand takes shape against the blurred multitudes in the distance. Bunched up at the mouth of a stream that trickles into the lake, the tightly packed mass revolves through the fresh water, each bird jackknifing for a few minutes as it pauses for a drink. At first my arrival pushes a big bulge into the flock but thirst soon restores the smooth contour. Pelicans sail low over the flamingos. Not flapping for seconds at a time, they enter a glide path a hundred meters long which carries them into the pool of fresh water. Blobs and dabs and washes of flamingos are everywhere. The sky rains flamingos; in specks and spatters they fill up the mist rising from the lake. Just as many take flight and disappear. I drift into a pink trance.

"Haf you seen ze heepos?" A heavy voice ambushes me from behind. Swaying on top of a small rock to keep his shoes out of the muck, a stout, red-faced German peers through heavy binoculars. "Heepos kum up out of zis vassa to shore, rrright srough ze flaminkos ven ze sun sets." Out of politeness I mumble something and try to find a hippo hiding in the pink vegetation. More German tourists are arriving on tiptoe in the sticky black mud. Together we scan the lake for hippos, pointing, laughing, and finally retreating to our respective campfires.

That night I dream that Roger and I go bird watching together in Ohio and both of us add one to our life list. Ahhhhh, Africa! □

Tim Fitzharris is currently at work on a book for Viking Press, *Canada: A Natural History,* to be published this fall.

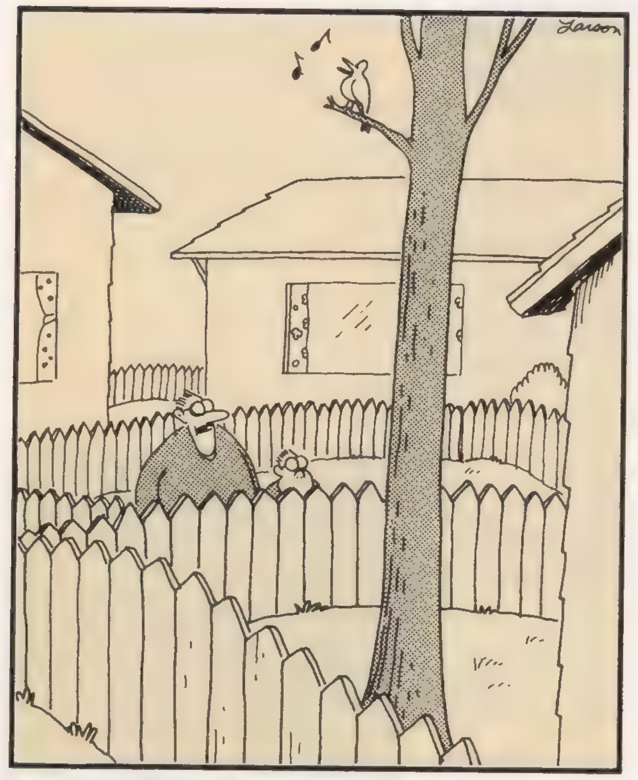
THE ROYAL BOOT

JAMES L. HAYWARD

In a fence-laced neighborhood from Gary Larson's the Far Side, father and son peer over the pickets to view a bird perched in a neighbor's tree. "And now, Randy," says the father, "by the use of song, the male sparrow will stake out his territory . . . an instinct common in the lower animals."

Indeed, territoriality is common to many of us, feathered and unfeathered. Territories provide shelter, nourishment, safety, and a place to raise our young. We do not know how or when the instinct of territoriality arose, but its widespread occurrence among animals from fiddler crabs to humans implies longstanding significance.

Human territoriality is a complicated affair involving attorneys, deeds of trust, surveyors, property lines, signs, and, of course, fences. Territoriality among birds involves boundaries, singing, posturing, chasing, or just being conspicuous. But the common denominator of all territoriality is communication among organisms. Without communication, territories would be impossible to maintain.



"And now, Randy, by use of song, the male sparrow will stake out his territory . . . an instinct common in the lower animals."

The Far Side is reproduced by permission of Chronicle Features, San Francisco.

A male red-winged blackbird, for example, spends much of his time during the breeding season singing, flashing his red epaulets, and moving from one cattail to another along his territory boundary. If a neighboring male ignores these signals and crosses the boundary, the resident male will chase him out. The resident male expends all this energy because the territorial intruder represents a threat to his genetic sovereignty; he wants his females to raise *his* young, not someone else's!

My interest in territorial communication began in 1971 when, as a college senior, I visited a gull colony being studied by Dr. John Stout. Stout and his students investigated communication among glaucous-winged gulls for nearly two decades, and I was fortunate to be involved in this fascinating work.

ARTHUR MORRIS/VIREO

Although birds don't use fences, they do have well-defined boundaries between their nesting territories. At left two herring gulls face off across a boundary, invisible to humans but apparent to the birds.

Glaucous-winged gulls nest in large numbers on some of Washington's San Juan islands. These islands are usually treeless and rocky. The gulls build simple ground nests of grass, small sticks, or seaweed. A typical colony of several acres contains thousands of nests separated by from 3 to 10 feet. Although the territorial boundary surrounding each nest was invisible to us, the resident pair knew its precise location. If another gull violated that line by walking across it or alighting inside it, a bout of territorial signaling ensued. It was this signaling that we sought to understand through our research.

The research consisted of two phases. During the first phase we observed and then recorded on film and videotape hundreds of encounters between territory intruders and residents. Then with the help of a computer program we determined the sequence of behaviors, that is, which behaviors followed one another during each interaction. Finally we formed hypotheses about the meanings of these behaviors. For example, we postulated that the lower the head and neck of the gull during a display, the more aggressive is that display.

In the second phase of our research we built remote-controlled, life-sized models of gulls which we operated from behind our blinds (see next page). The models served as surrogate intruders whose "behavior" was under our complete control. Real gulls treated the models like actual intruders. By observing the responses of defenders to the postures and movements of our models, we were able to determine whether our hypotheses made sense.

And, indeed, we demonstrated that gull communication occurs through vocalizations, posturing, orientation, and movement. Complete messages may contain one or more of these elements and may occur concurrently or in a sequence. Furthermore we demonstrated that the lower a gull's head and neck, the less likely it is that the bird will be attacked.

Although a few intruders are intent on snatching eggs or chicks for food, most seem to be looking merely for a place to loaf. Residents, however, treat each territorial invasion as if it were life threatening. And, unlike many birds, both male and female gulls share a role in territory defense.

More than 90 percent of intruder-defender interactions take only a few seconds. Such encounters occur when an intruder alights with its body turned away

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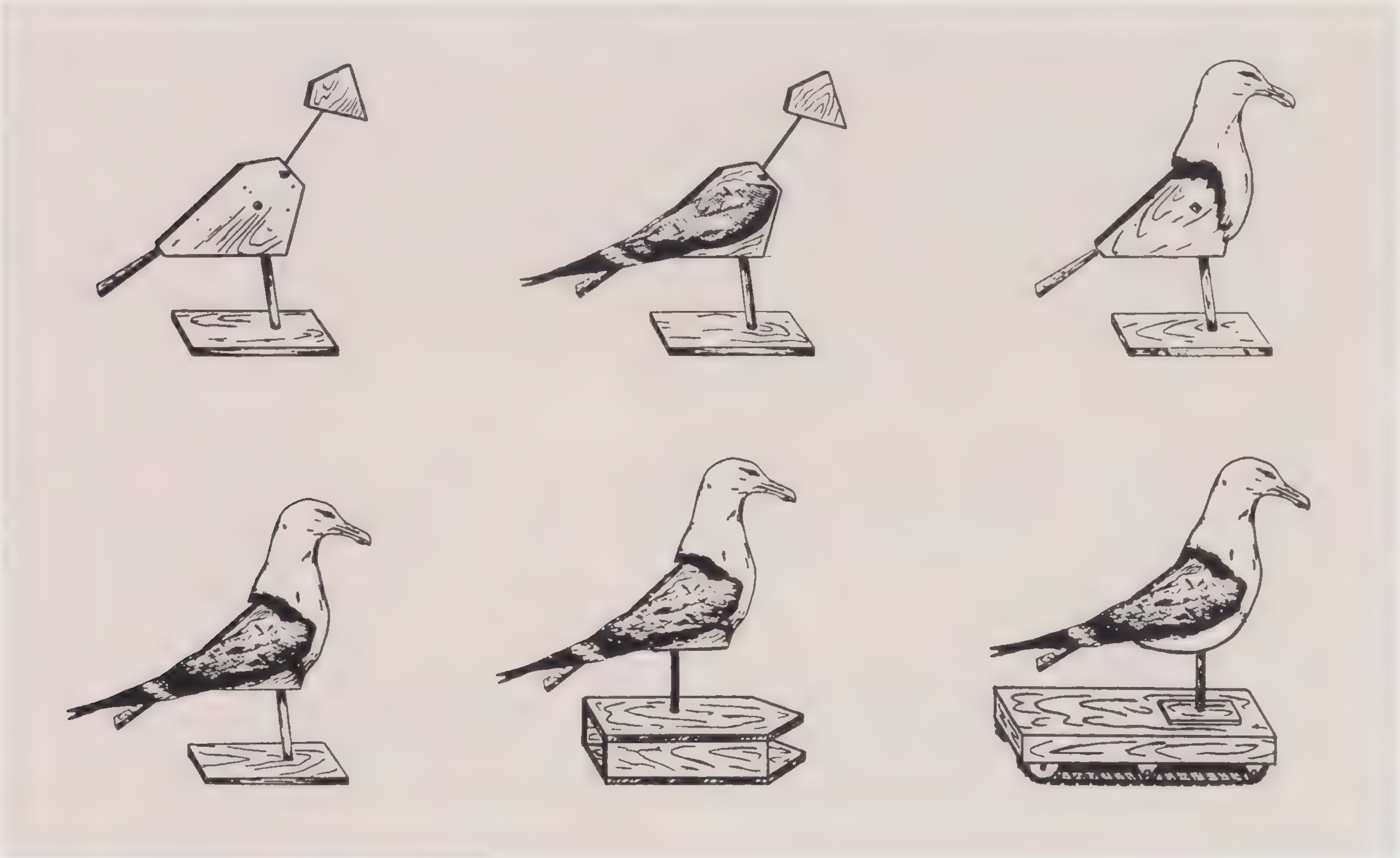


Illustrations from *Behaviour*, Vol. 34, Part II, E. J. Brill (Leiden, 1969). Used by permission.

Supergull

Nobel laureate Niko Tinbergen has taught us the importance of using experimental models in our search for an understanding of animal behavior. Models provide answers to questions about behavior which simple observational techniques do not.

John F. Stout at Andrews University was trained in the experimental tradition; it was Stout who was the moving force behind my gull research. Many people had studied gull communication before Stout began his work in the 1960s, but few had bothered to use models. Models, after all, take time to make and use. But based on his knowledge of studies of fish behavior, Stout realized that models were essential for deciphering the meaning of territorial displays used by gulls.

Stout's first problem was to determine what parts of a gull's body are important during aggressive communication. He and his students built a series of models. The most primitive was made of wooden blocks and only vaguely resembled a real bird. When this model was placed in the territories of nesting gulls, it was completely ignored.

When a stuffed head and neck of a gull were placed on the model, however, the residents took notice. In fact, they attacked the model as if it were a living gull. In addition, Stout noted that when the head and neck were positioned in an upright posture, the model was attacked more frequently than when it was in the choke display. Apparently choke was more threatening to territory defenders. Stout now had verification of the importance of posture during aggressive communication.

But real intruders do not enter a territory and simply stand in one position, and Stout reasoned that the changes which occur in the intruder's posture relative to another gull could convey significant information. So Stout developed a new generation of models with heads and necks that could be raised and lowered, and bodies that could pivot on wooden bases and be radio-controlled from blinds. These models showed that changes in posture were indeed important. Furthermore, the sequence of postures was significant, as were the orientations between the model and the territory defender.

As Stout's understanding advanced, an additional element emerged that was lacking in the models: movement toward and away. After two years of trial and error Stout developed a remedy for this deficiency—Supergull—a radio-controlled model that could move forward and backward, turn in any direction, traverse almost any terrain, and move into a gull colony and challenge its residents.

Supergull clearly demonstrated the importance of movement toward and away during aggressive encounters. If the model "turned its back" on the defending gull, it was likely to be attacked. If the model moved toward the defending gull, the real bird mewed and choked or backed off.

Supergull was one of the most sophisticated models ever developed to help us understand animal behavior. The application of electronic and computer technology to the solution of biological problems continues to revolutionize our concepts about the living world.—JLH from the defender, exhibiting a timid, frightened appearance, its neck outstretched and bill slightly upturned. The defender quickly rushes toward the intruder with outspread wings and an open, jabbing bill (the message of which is obvious), or walks toward the trespasser in an aggressive upright posture. The neck is extended upward, and the head and bill are tilted downward ready to stab. "Buddy," the defender seems to shout, "you better beat a hasty retreat!" Rare is the intruder that will hold its ground in the face of such a threat.

Though not as frequent, the more interesting interactions are those involving intruders that, for no apparent reason, seem more threatening or tenacious. A tenacious intruder walks into or alights on the territory facing the defender. Also, rather than assuming a timid posture, a threatening intruder appears confident, ready to challenge the defender's right to the territory.

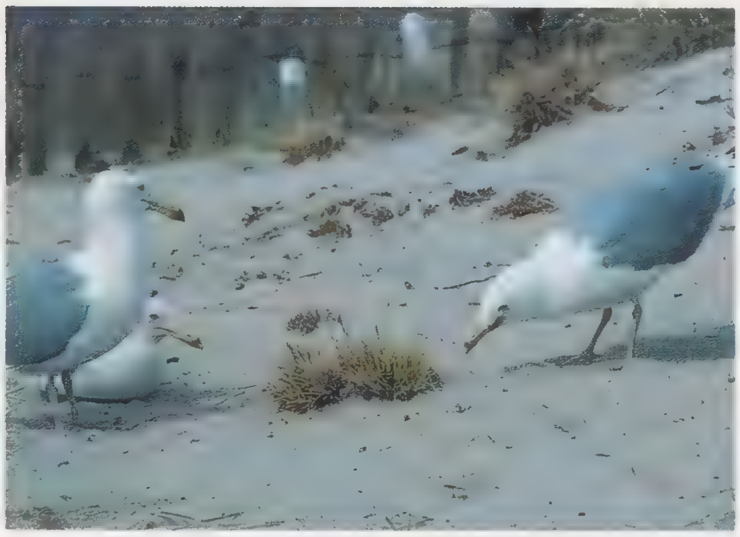
In the face of such an intruder, a defender is in a tight spot. By yielding to the threat it stands a good chance of losing its territory, nest site, hard-earned eggs, or young and mate. But by accepting the challenge to fight, the defender could lose an eye. Given these choices it generally opts for a third strategy, display.

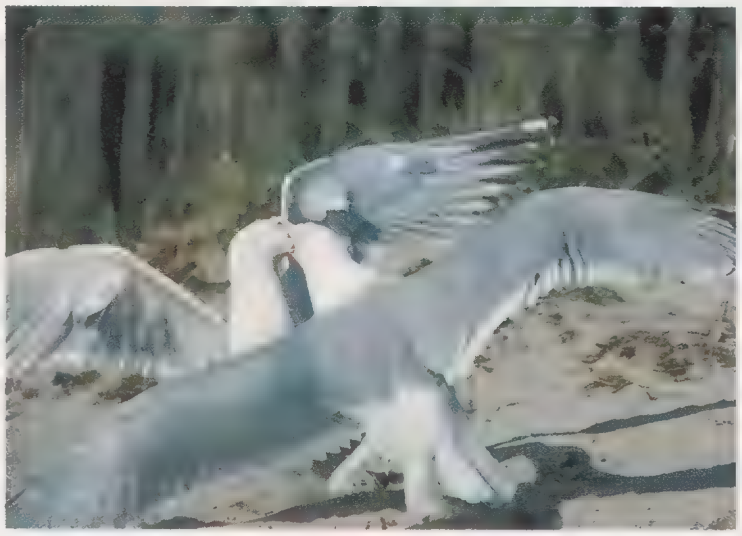
Displays are visual or vocal signals understood by all members of a given species. Many animals use displays when fighting or fleeing is impractical. Displays entail moving the body or making it look larger or more colorful. For example, great horned owls puff out their feathers when faced with danger. Male Siamese fighting fish turn sideways and spread their gorgeous red or blue fins in response to rival males. And threatened humans wave their fists and pound on tables.

A gull displays by positioning its head and neck in various ways, by holding its wings out from its sides, or by moving its whole body in special patterns. Often these displays are accompanied by vocalizations that reinforce the visual signals. During one display, called mew, the bird arches its neck and utters a mournful call not unlike that of a cat's meow. Mew is often sufficient to nudge an intruder out of the territory. Intruders may interpret this display to mean that defenders are serious about protecting their territories.

Mew is often followed by choke, in which the defender crouches and utters a low, rhythmic sound something like a choking human. Tenacious intruders may be subjected to a long series of mew-choke bouts. Such bouts generally occur only when both members of the defending pair are present.

If mew and choke do not succeed in routing an intruder, the defender's only option is to attack. But this is not done quickly as in duels with nonthreatening intruders. Rather, the defender walks toward the offensive bird in an aggressive upright posture, leaving the intruder ample time to escape. In witnessing tens of thousands of aggressive interactions among gulls, I have never seen an intruder hold its ground past this point.





ARTHUR MORRIS/VIREO (2)

When a bird enters its neighbor's territory, a confrontation ensues. Most encounters involve one or more ritualized displays (top photo) during which the territory holder confirms his dominance, the intruder leaves, and no one is injured. Sometimes, however, the intruder stands his ground, forcing the territory holder to battle for his home turf (below). During territorial fights, injuries such as lost eyes may occur.

Many additional factors influence the nature of territorial encounters among gulls. A defender seems less likely to respond quickly to an intruder during the heat of the afternoon than in the cooler morning or evening hours. Perhaps, like lethargic humans, gulls are less alert at these times. Also, reproductive behavior in birds is closely tied to blood hormone levels. Toward the end of the breeding season, hormones promoting territoriality wane and territory owners become less aggressive. By this time the young are almost as large as the parents anyway and quite capable of defending themselves.

There is still much to understand about territoriality in gulls. We have learned, however, that these birds possess a communicative repertoire versatile enough to meet the demands of any territorial encounter. More impressive, through communication gulls live together in dense colonies numbering in the thousands, yet maintain orderly (albeit noisy) societies. ☐

James Hayward is a professor of biology at Andrews University, Berrien Springs, Michigan. In addition to gull watching, he likes thinking about life in the past. His current research is investigating how bird and dinosaur eggs became fossils.

Further Reading

Tinbergen, Niko. *The Herring Gull's World.* William Collins Sons & Company, London. 1953. Revised edition 1960.

———. "The Evolution of Behavior in Gulls." *Scientific American,* December 1960.

——— and Hugh Falkus. *Signals for Survival.* Clarendon Press, Oxford. 1970.

The Royal Feather

ROGER G. ROSE

The inhabitants and visitors assembled at Kealakekua Bay on the Kona coast of Hawai'i Island were filled with expectation. Canoe traffic ceased and word came that the great chief Kalani'ōpu'u was due to arrive from a neighboring district. It was the height of the annual *makahiki* festival, and by coincidence Captain James Cook had anchored his ships in the bay a few days earlier. Cook, who the Hawaiians believed to be a manifestation of the god Lono, was about to meet the ruler of the island.

January 26, 1779. With Kalani'ōpu'u in the lead, three double canoes carrying a retinue of chiefs and priests paddled out in stately procession past Cook's ships, "Singing with much Solemnity; . . . their appearance was very grand, the Chiefs standing up drest in their Cloaks & Caps," wrote Cook in his journal. Hurrying ashore, Cook formally met the venerable Kalani'ōpu'u who, contemporary journals recorded, "got up & threw in a graceful manner over the Capt^{ns} Shoulders the Cloak he himself wore, & put a featherd cap upon his head, & a very handsome fly flap in his hand: besides which he laid down at the Captains feet 5 or 6 Cloaks more, all very beautiful, & to them of the greatest Value."

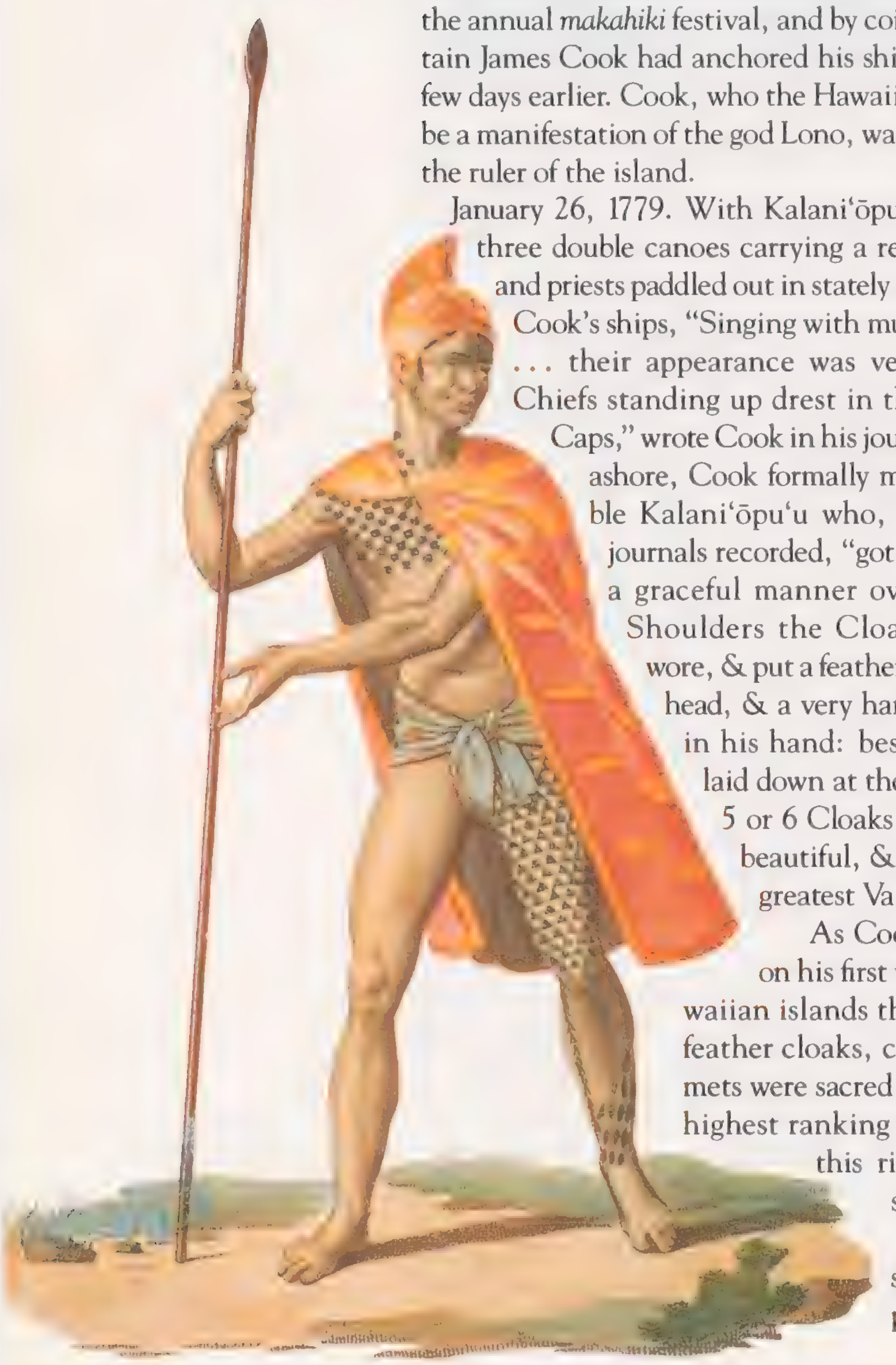
As Cook had learned on his first visit to the Hawaiian islands the year before, feather cloaks, capes, and helmets were sacred insignia of the highest ranking male chiefs of this rigidly stratified society.

Featherwork such as that presented to Cook was worn only in battle or on state occasions, or given in ceremonial gift exchanges. These symbols of prestige and power could be passed down from chief to chief or taken as spoils of battle, thus passing from vanquished to victor. As battle uniforms and robes of state, the "beauty and magnificence" of these feathered garments were "perhaps nearly equal to that of any nation in the world," to use the words of Cook's companion, Captain James King. To Hawaiians of today, featherwork is a living legacy of their ancestors' creativity and skill, as well as a symbol of the islands' proud past.

In Cook's day, Hawaiians made cloaks and capes in many shapes and styles. The owner's rank and status, and his family and place of origin influenced the appearance of pre-European featherwork, but standardization began to prevail by the early 19th century. As more and more were traded or exchanged ceremonially to visiting Europeans and Americans, rectangular capes of seabirds and other coarse feathers, as seen by Cook and other early visitors, were replaced by the more common circular ones with shaped collars, fashioned predominantly from tiny red and yellow feathers.

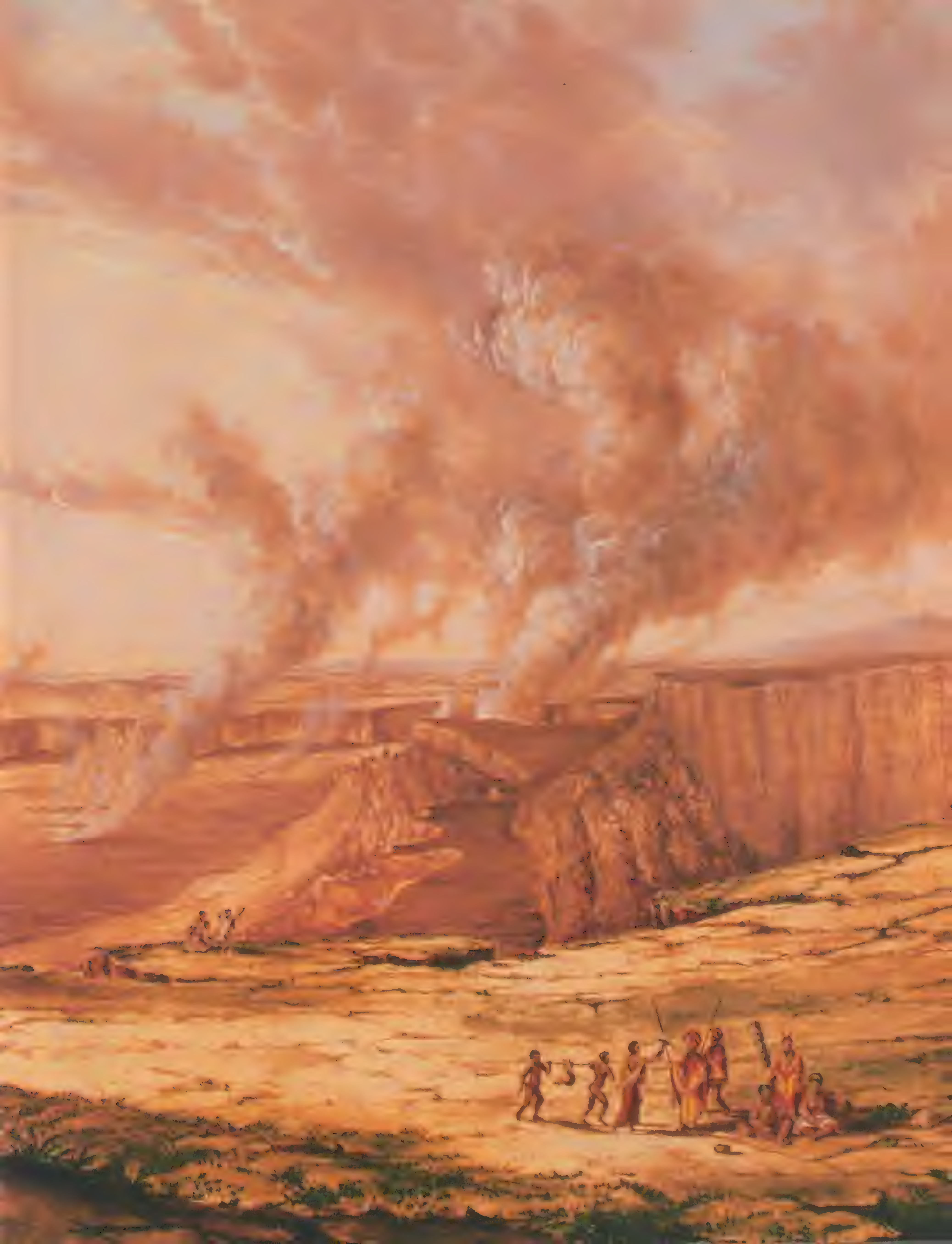
Early Polynesian settlers introduced a reverence for red feathers as representations of their gods and chiefs. Later Hawaiians elaborated on the concept by adding the yellow feathers of two endemic birds to their evolving featherworking technology. By the 19th century, Hawaiians referred to all full-length cloaks and shorter capes, regardless of color, as "red shoulder garments," or *'ahu'ula*, doubtless a reflection of these ancient Polynesian connections.

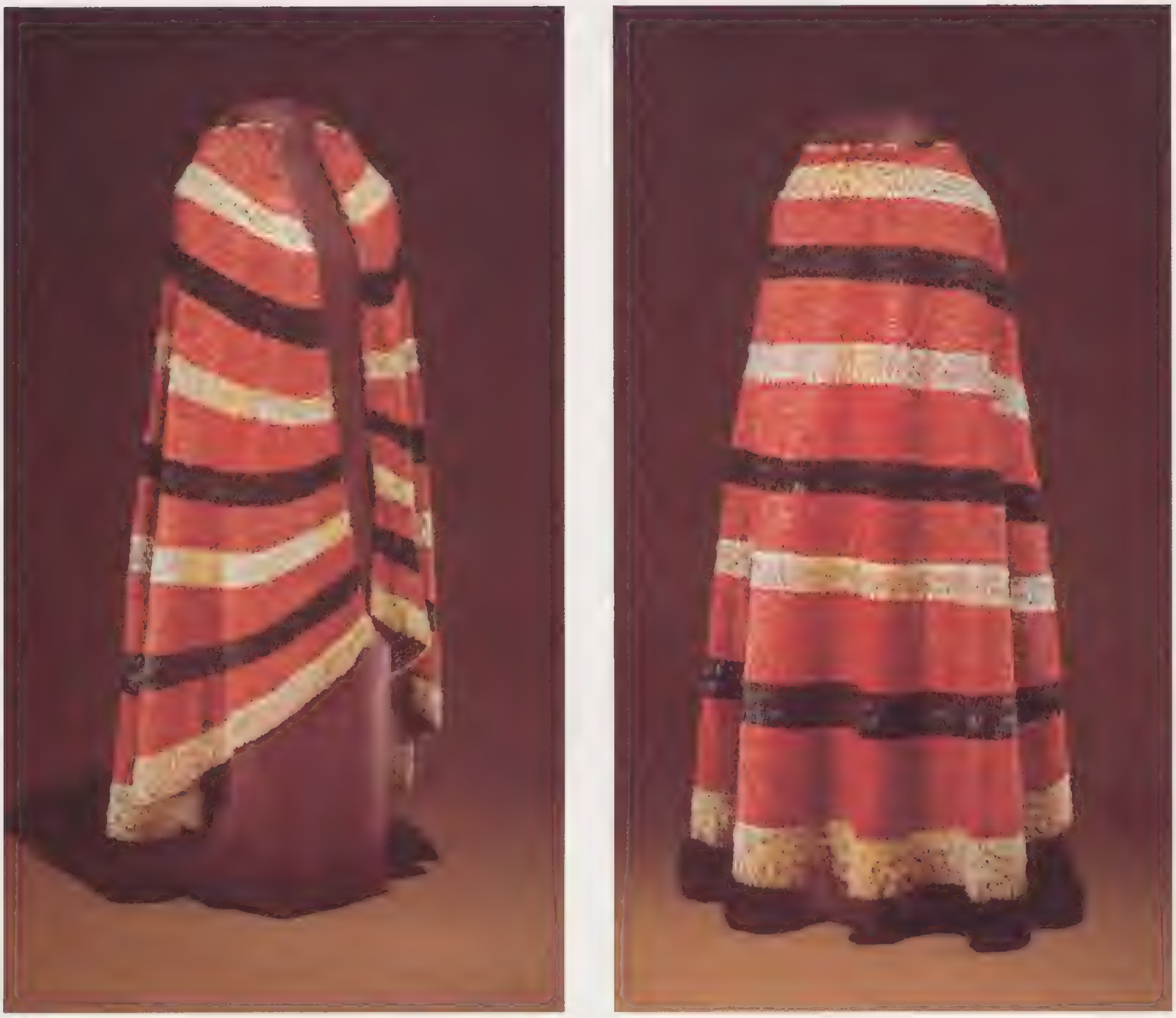
With a few exceptions, capes were made from the feathers of small Hawaiian forest birds, the honeyeaters and honeycreepers. Most important were the red 'i'iwi and 'apapane, and two black birds that have



Tattooed chief in feathered regalia, 1817.
Right, chiefs and retainers in feathered garments, Halema'uma'u Crater, 1842.

All photos courtesy of Bernice Pauahi Bishop Museum.





Above: The parallel lines of this cloak are unusual in Hawaiian featherwork. Crescents, lozenges, and triangular shapes are more typical. Right: The extraordinary expanses of rare yellow mamo and ‘ō‘ō feathers used in these three garments indicate that they were worn by the highest rank of men.

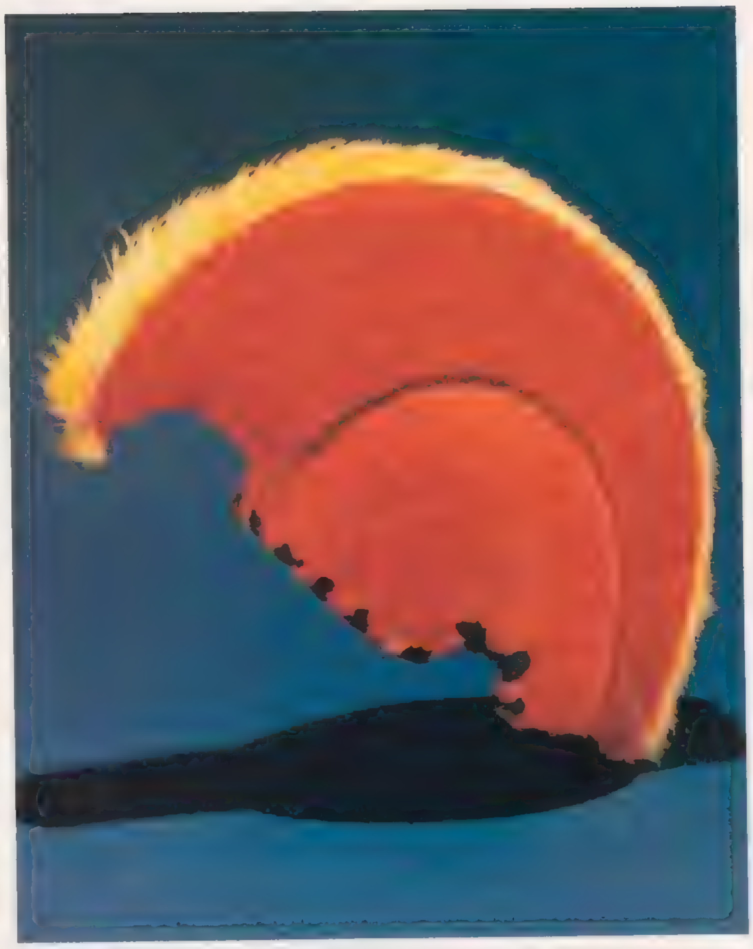
a few coveted yellow feathers under their wings and thighs, or tail, the ʻōʻō and the mamo. Green feathers were obtained from two other honeycreepers, the ʻōʻū and ʻamakihi. For capes and cloaks worn by lesser chiefs, Hawaiians used feathers of their domestic chickens, as well as those of tropicbirds and frigatebirds. With such raw materials, it is little wonder that Cook compared the cloaks and capes "to the thickest and richest velvet . . . both as to the feel, and the glossy appearance."

Because the male chiefs of high rank who wore ʻahuʻula were considered sacred, their featherwork had to be made in accordance with the rigid taboos that infused traditional Hawaiian society before its collapse in 1819. To start, professional bird hunters captured their prey with sticky gum, nets, and other devices, releasing the ʻōʻō and mamo after plucking the sparse yellow feathers, but killing and often eating the all red ʻiʻiwi and ʻapapane, which could not have survived the plucking. Next, featherworkers cleaned and selected about a dozen feathers, carefully matched for size and luster, and bound them into a small cluster with fine bast thread laboriously prepared from the olonā shrub. When enough had been accumulated, the clusters were tied in overlapping rows, like the shingles of a house, to the meshes of a finely netted and shaped foundation made from the twisted fibers of the same plant.

Fabricating a full-length cloak was a painstaking and time-consuming task. Some half-million feathers, representing 80,000 to 90,000 birds, were required to complete the famous all mamo cloak of Kamehameha the Great, since each mamo yielded only six or eight usable feathers. One of only three cloaks that remained on the islands, it was dubbed the "million dollar cloak" as long ago as 1839, when historian and art critic J. J. Jarves wrote: "the value of the cloak would equal that of purest diamonds in the several European regalia, and including the price of the feathers, not less than a million dollars worth of labor was expended upon it, at the present rate of computing wages."

Despite Kamehameha's reputed concern for their protection ("the feathers belong to me, but the birds themselves belong to my heirs"), birds favored for featherwork are today extinct or endangered, victims of introduced pests, disease, and shrinking habitat as much as of excessive hunting. By 1883, as King Kalākaua arranged to celebrate his coronation with what he could summon of the regal pageantry of former times, most of the capes needed for the occasion had to be specially made. His featherworkers had to substitute duck or chicken feathers, dyed red and yellow, and had to employ new techniques, the traditional skills having vanished through lack of use.

Today, 60 long cloaks and twice as many shoulder-length capes are preserved in museums and a few private collections around the world. More varied than either the capes or cloaks, about 75 helmets are also preserved.



Far left, top. Black feathers are uncommon on feathered garments. On this cape the checkerboard is unique and inspired by a European design. Below, pointed crescents, finlike motifs, and parallel bands hold hidden meaning. Helmets such as the one at left probably were worn more for the appearance of invincibility than for protection against rocks and spears.

Although the complexity of the designs on capes and cloaks is bewildering to the casual observer, close examination reveals a subtly controlled use of crescents, lozenges, triangles, narrow bands, occasional circles, and rectangles—and even hearts. Except for the Western inspiration of the last, on an obviously newer cape, very little is understood of the symbolic meanings of these other elements of design; they remain an enigma today.

Brilliantly colored feather *lei*, or necklaces, were made and worn by women of chiefly rank as personal adornments for their hair or neck, and such heirlooms are still seen at appropriate social functions throughout the islands. Although traditional capes and cloaks ceased to be made over a century ago, *lei* continue to be created in great variety, both in the old circular form and in the newer, flat style for use as hat bands. Dyed feathers of domestic fowl and various exotic birds, such as pheasant, peacock, or mallard, and other introduced species have long since replaced those of the indigenous forest birds.

The making of feather *lei* is today very much an expression of an ancient art. Within the last decade, coinciding with the emergence of a renewed interest in traditional Hawaiian culture, a few skilled artisans also have turned their attention to the capes and helmets of old—perhaps heralding the rebirth, albeit in modified form, of this distinctive art that has long been the special emblem of Hawaiʻi. ☐

Roger Rose is a research ethnologist in the Department of Anthropology at the Bishop Museum in Honolulu.

Further Reading

Holt, John Dominis. *The Art of Featherwork in Old Hawaiʻi.* Topgallant Publishing Co., Honolulu. 1985.

Of Muck and Men

Last March, as the gray misery of an Ithaca, New York, winter languished outside my windows, I packed up my binoculars and camping gear and flew to Miami. What an escape! I left Ithaca in a snowstorm; when I stepped off the plane at Miami International, I found myself in a tropical wonderland. The air temperature was 80 degrees, the sky was as blue as polished turquoise, and palm fronds waved in a gentle breeze. And birds—exotic birds!—appeared immediately. From the rental car parking lot I watched a spot-breasted oriole forage in some nearby trees as a formation of white ibises flew overhead.

I stayed nine days. I drove down to Everglades National Park where I camped in a quiet pine forest and watched soras, purple gallinules, and snail kites in the marshes. I found a bald eagle nest near the Tamiami Trail, one of south Florida's major highways. I visited Corkscrew Swamp Audubon Sanctuary where a barred owl perched unconcernedly near the boardwalk. And I hiked through the Ding Darling National Wildlife Refuge on Sanibel Island and watched a huge flock of roseate spoonbills fly through a flaming sunset. A fantastic trip through a birder's paradise.

But is south Florida really a paradise? Consider: salt water contaminates part of the region's underground water supply, rendering it undrinkable. Fish and shellfish have vanished from many lakes and estuaries. The vast waters of Lake Okeechobee, the largest lake south of the Great Lakes, are polluted by fertilizers and farm wastes. And the everglades—a huge and unique wilderness that is home to a fascinating blend of plants and animals—is slowly dying.

These problems have a common root: a century's worth of human occupants, eager to live in the land of sunshine, have manipulated south Florida's natural water flow to control floods and drain lands for agriculture and the development of cities, towns, and suburbs. And because the region's flora and fauna evolved in concert with the natural water flow, manipulation of the flow has caused tremendous ecological disturbances.

Travel back in time about 100 years. It was quiet in south Florida, then, and sparsely inhabited. Most of the residents made their living by fishing, hunting, and growing a few vegetables in the black muck soil. Winters were usually warm and dry. But each April the summer rains returned, and the 200-mile-long flow of water that replenished the land began anew.

The flow started in the Kissimmee lakes, a large chain of lakes just south of present-day Orlando. As the rains fell these lakes overflowed, spilling water southward into the meandering Kissimmee River. Then the Kissimmee swelled, spreading east and west over a wide floodplain and filling the vast bowl of Lake Okeechobee, 100 river miles to the south. When Okeechobee was full it also overflowed, southward, in a vast, shallow sheet—50 miles wide, but only several inches deep—that ran under millions of acres of sawgrass known as the everglades.

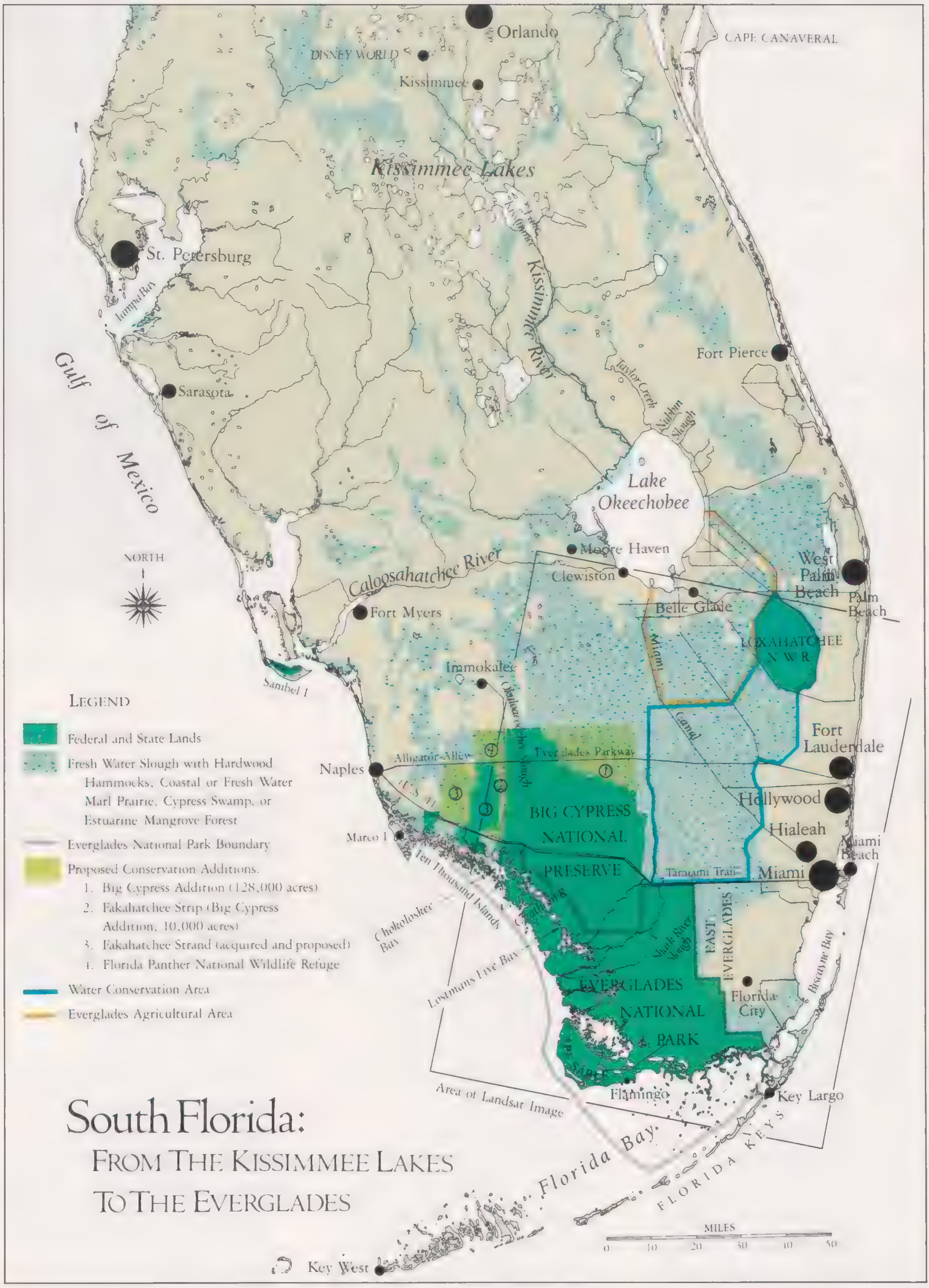
Much of Florida's southern tip, then, was one wide river filled with emergent vegetation. "Pay-hay-Okee," the Indians called the region, which meant "grassy waters." The water flow depended entirely on the seasonal rains. During summer the river ran deep; during winter the land dried. Even so, the earth was seldom parched. Long after the rains had ceased water continued to flow down the peninsula's slight slope, slowly on toward the sea. Only during drought years did the land bake and the vegetation wither.

The grassy river was the blood of this unique ecosystem. The water provided a home for small fish and mammoth alligators. It provided feeding areas for millions of wading birds—herons, egrets, ibises, storks—which darkened the skies each morning and evening as they flew to and from their roosts. It provided food and canoe trails for several hundred Indians as well as a few hardy settlers who braved the alligators and, far worse, ferocious mosquitoes. And finally it mixed with the salt water of Florida Bay, creating a brackish estuary rich in marine life and recharging a huge underground freshwater reservoir known as the Biscayne Aquifer.

But by the turn of the century, not everyone saw the water as nourishing or useful. For the businessmen and politicians who wished to see south Florida settled by more than a few pioneers, the water was a big problem. There wasn't enough dry land to build the towns and railroads needed to support an economy. The solution: drainage! As Marjory Stoneman Douglas put it in her classic book *The Everglades: River of Grass*: "Drainage of the everglades would be a Great Thing. Americans did Great Things. Therefore Americans would drain the everglades. To all the consequences of disturbing the fine balance nature had set up in the past four thousand years, no one knew enough to look. They saw the everglades no longer as a vast expanse of sawgrass and water, but as a dream, a mirage of riches."

And so the warcry was sounded. First came Hamilton Disston of Philadelphia, who wished to drain not only the everglades but also the Kissimmee Valley. He went broke in 1883, but not before digging a short canal between Lake Okeechobee and the Caloosahatchee River, and straightening portions of the Kissimmee. Then came Napoleon Bonaparte Broward, a big man with black eyes and a handlebar mustache who won the Florida governorship in 1905 on a platform consisting largely of drainage plans. Later that year Broward sent two dredges moving up the New River, which flowed south out of Okeechobee. The big machines dug out the river's bottom muck so the current would run deep and fast and carry unwanted water from the glades to the sea. Soon, according to Douglas, "The first humus-laden dark water began to creep unnoticed down the clear current of the lovely river, staining the bright white bottom sands."

During the next few years more dredges were set to work on other rivers. The slow lazy flows were transformed into straight, deep ditches, and the glades began to dry out. As the



South Florida: FROM THE KISSIMMEE LAKES TO THE EVERGLADES

Orlando
DISNEY WORLD
Kissimmee
CAPE CANAVERAL
Kissimmee Lakes
Kissimmee River
St. Petersburg
Tampa Bay
Gulf of Mexico
Sarasota
Fort Pierce
Taylor Creek
Nubbin Slough
Lake Okeechobee
Moore Haven
Clewiston
Belle Glade
West Palm Beach
Palm Beach
Caloosahatchee River
Fort Myers
NORTH
Sanibel I
Immokalee
LOXAHATCHEE N W R
Miami Canal
Fort Lauderdale
Naples
Alligator Alley
Everglades Parkway
U.S. 41
Hollywood
Hialeah
Marco I
BIG CYPRESS NATIONAL PRESERVE
Tamiami Trail
Miami
Miami Beach
Ten Thousand Islands
Chokoloskee Bay
Lostmans Five Bay
Shark River Slough
EAST EVERGLADES
EVERGLADES NATIONAL PARK
Florida City
Biscayne Bay
Flamingo
Key Largo
Area of Landsat Image
Florida Bay
FLORIDA KEYS
Key West
MILES
0 10 20 30 40 50
LEGEND
Federal and State Lands
Fresh Water Slough with Hardwood Hammocks, Coastal or Fresh Water Marl Prairie, Cypress Swamp, or Estuarine Mangrove Forest
Everglades National Park Boundary
Proposed Conservation Additions.
1. Big Cypress Addition (128,000 acres)
2. Fakahatchee Strip (Big Cypress Addition, 10,000 acres)
3. Fakahatchee Strand (acquired and proposed)
4. Florida Panther National Wildlife Refuge
Water Conservation Area
Everglades Agricultural Area

Map by Wilma E. Frey, A.S.L.A., and Allison M. Frey. Courtesy of The Wilderness Society.

land became usable, land prices rose. New towns and farms appeared. The region was still very wet and often flooded by heavy rains. Nevertheless towns continued to grow and sugarcane began to replace sawgrass.

Then, in 1926, a hurricane tore through the area. Three hundred people drowned in the city of Moore Haven. Two years later came another storm. Wrote Douglas: "The lake [Okeechobee] with a long howling swept over everything. Lives were smashed out under tons of water in the night, choked with mud, crushed under the weight of blown debris. When the light came back to the lake there was one wilderness of water everywhere, in which the dead lay like logs."

This time 1,800 people had died, and Congress told the Army Corps of Engineers to do something before tragedy struck again. The Corps obliged. It built a tremendous dike around the lake and dug deep canals from the lake to the sea. Now Okeechobee was tamed; excess water would be contained or would flow off harmlessly through the canals. South Floridians felt secure.

They shouldn't have. Several years of low rainfall followed, and since Okeechobee's waters no longer flowed into the everglades, the whole region dried up like never before. Fish died, filling the air with their stench. Birds left in search of water. Dead sawgrass rustled like paper.

Then the glades caught fire. By 1945 what had been a river of grass had become a river of flames. Douglas again: "All night long the fires stood about the sky . . . the flames reflected on the churning orange pillars of their smoke. And when in the daytime they had passed slowly, burning and glowing down to the rock, behind them was only the blackness of desolation." As the acrid smoke rolled over the southern cities, people choked and suffocated.

Furthermore, while flames raged through the glades, salt water began backing up into the area from the sea. For centuries the brine had been held at bay by fresh water flowing down from the north, but now the tides moved up empty rivers and drainage canals. Wells turned brackish and soil turned salty.

That fall the fires were finally extinguished by welcome rains. The drought was over. But something else was finished, too: the patience of conservationists with the government's unwillingness to act to protect the vulnerable ecosystem. These folks had been demanding for years that at least part of the everglades be made into a national park. Now, the nationwide hue and cry of concerned citizens over the dying region was too loud to ignore. And so two years later, in 1947, Everglades National Park was formed from 1.4 million acres of everglades at the southern tip of the Florida peninsula.

But south Florida's suffering was far from over. The year of 1947 not only welcomed the new park, it brought another hurricane. As torrential rains slashed the skies, and towns and fields flooded yet again, the state of Florida asked the federal government to authorize the Army Corps of Engineers to solve the water problems once and for all.

The government obliged. Or at least it tried to, by setting up the Central and Southern Florida Flood Control District, now called the South Florida Water Management District (SFWMD). Its purpose: to build water control structures that would prevent flooding during the wet season, conserve water during the dry season, drain land for agriculture, reduce intrusion of salt water into freshwater aquifers, *and* help to restore and maintain natural conditions in the brand-new national park by reducing damage from drought and fire.

A tall order! The only way to fill it, district officials believed, was to undertake one of the largest rearrangements of nature ever conceived. So over the next 20-odd years the Army Corps laced the everglades with hundreds of miles of canals, levees, ditches, and dikes. It channeled the 100-mile, meandering Kissimmee River, turning it into a 50-mile ditch. And it installed water-control gates north of Everglades National Park that could be opened and closed by flipping a switch.

The results of all this plumbing? Some might seem positive: floods are by and large controlled. Water is often conserved. And south Florida is covered with productive farms.

Nevertheless the water control structures have had disastrous effects on the region's ecology. Examples: fish are dying by the bucket in Lake Okeechobee. Coastal fisheries are declining and disappearing. Salt water is seeping into underground fresh water supplies. And Everglades National Park is losing its huge populations of wading birds.

MARTY CORDANO

The natural flow of water throughout south Florida has been disrupted by canals and water control structures such as these along the Tamiami Trail. As a result, the entire everglades ecosystem is dying.

How did water control cause such ecological disturbance? In the Kissimmee Basin, the meandering river had been nurturing a vast system of marshlands for hundreds of years. When the river was channeled the marshes dried up and disappeared. In their place came farms, which brought fertilizers and cow plop. These drained into the new channel and were shot straight into Okeechobee's midst. Before long the lake was choking with an overload of phosphorous, nitrogen, and other nutrients. Algae grew and fish died. And many of the pollutants continued downstream into the everglades.

Yet increased pollution is only part of the downstream problem, because the water control structures have totally disrupted the natural flow of water through the glades, including the national park. Now, to receive most of its water, the park must wait until the SFWMD opens the gates and allows impounded water to flow through. Therefore, water flow into the park is highly erratic. In dry years it receives very little water, for most is siphoned into farm fields north of the park and into thirsty, coastal cities. But in wet years the park may become inundated. Water first accumulates in storage areas to the north. Then, when floods threaten, water is released into the park with a whoosh.

The fluctuating water levels have played havoc with the entire everglades ecosystem. In years when the freshwater flow through the glades and into the sea has been stopped, salt water has flowed inland and filtered into the region's drinking water. Furthermore, coastal fisheries have declined because estuaries have become too saline for fish to survive.

Also reduced are the once vast flocks of wading birds. In the 1800s these long-legged creatures numbered an estimated 2.5 million. Today fewer than 250,000 remain, according to some biologists. That's a 90 percent reduction! Other birds, such as ospreys and brown pelicans, have suffered too. Why? During dry years the birds can't find enough food because the fish, snails, and other small invertebrates that they eat all disappear. But during wet years the birds still can't find enough food, because their prey disperse throughout the glades rather than concentrating in the few deep pools that would remain during a normal year.

The up-and-down waters also have drowned alligator eggs, allowed trees and shrubs to take over sawgrass, and encouraged the invasion of exotic plants such as Brazilian pepper and Australian pine, which crowd out native plants on which the region's wildlife depends for food and shelter.

For many years the government—both state and federal—mostly ignored these problems. In 1971 the U.S. Congress did pass legislation guaranteeing that Everglades National Park would receive a minimum of 315,000 acre feet of water each year. Although the legislation was helpful, it failed to address the park's need to receive water on a schedule that resembles natural water flows.

Besides, 315,000 acre feet was not enough water. In 1981 Florida suffered another drought. Again the everglades caught fire, sending clouds of smoke over Miami, Fort Lauderdale, even the Palm beaches. An underground wedge of salt water moved inland, tainting water supplies. Water was rationed. And, of course, the park suffered as well. In February of 1983, park research director Gary Hendrix told the SFWMD that only swift, emergency action to restore the region's historic wet and dry seasons would give wildlife a chance to recover.

Fortunately the plea did not fall on deaf ears. Florida finally had a governor—Bob Graham—who was acutely concerned about the everglades. He advocated a program, named Save Our Everglades, designed to let the water back in. The idea: use the SFMWD's sophisticated, computer-driven network of gates, canals, and pumps to mimic historic water flow patterns.

Graham's plan called for the state to spend millions of dollars to restore wetlands in the Kissimmee Basin, to acquire huge chunks of land that could be returned to a more natural state by reflooding, and to remove certain levees and plug some canals so that the everglade's water supply would more closely resemble the original sheet flow. The funds would come from a tax on growth—a statewide assessment on real estate transactions—and an additional tax on oil and mineral mining. "Success in this endeavor means turning back the clock 100 years," Graham said. "By the year 2000, the everglades will look and function more as it did at the turn of the century than it does today."

Restoring natural water flow would not be easy, however. Water managers would have to accommodate the everglade's need for natural water conditions while still averting floods, sustaining agriculture, and preventing water shortages in cities. Nevertheless, after protracted discussion between the state and the Army Corps, the restoration program got under way in 1984 with the Kissimmee River Demonstration Project—Phase I.

The SFWMD began by installing weirs to divert water into certain bends of the old, meandering river channel. The idea was to raise the water to historic levels, thereby restoring 12 miles of riverside marshland. The SFWMD hopes that this experiment will illustrate the environmental gains that could be realized by larger-scale renovation of the basin. In Phase II of the project, which has yet to begin, more of the ditch will be plugged and more water will be diverted into the old riverbed.

On another front of the Save Our Everglades program, water managers have been working on a "rainfall-driven" model for water releases, by which water would be discharged into Everglades National Park in proportion to the amount of rain falling in areas upstream. Flows based on that model were begun into a portion of the park in 1985, and park biologists say that some benefits have already been realized. Also, the state has begun purchasing land that must be flooded to restore natural water flows, including 50,000 acres of critical land in the eastern part of the glades.

But obstacles to saving the everglades remain monumental. Sheet flow throughout the whole region cannot resume until more land is purchased and existing canals and levees are altered. The cost will be several million dollars. On the eastern side of the park some residents, worried about their lands being flooded, have begun lawsuits against the state to stop the natural flows. And the western part of the park, though healthier than the east, is threatened by the southward expansion of Florida's citrus industry.

Additional barriers to the program also exist. The Department of the Interior, which administers Everglades National Park, has refused financial assistance. The Army Corps of Engineers has regularly denied the state the federal permits needed to do much of the work. Agricultural and real estate interests have used a variety of tactics to stall the program. Finally, Governor Graham left office in January 1987, and the commitment of his successor, Bob Martinez, to the restoration program is still unclear. While Martinez has pledged not to abandon the everglades, he cautions that the Save Our Everglades program must compete with other environmental concerns such as garbage dump cleanups.

But the program must go on. Natural water flows must be restored to south Florida, not only for the sake of its flora and fauna but also for the sake of its human residents. Otherwise Lake Okeechobee is likely to choke under its ever-increasing burden of algae, salt water is likely to pour from Miami's taps, and fires will probably rage through the glades yet again.

Standing in the park last winter, watching a flock of egrets fly through the darkening sky from a fish-filled pond toward their mangrove roost, it was hard to believe that the everglades could die. And looking down on the glades from a 747 as I left the land of sunshine and headed back toward the northern gloom, it was hard to believe that the vast wilderness below me was under siege. Now, a year later, the trip is a storehouse of wonderful memories. I'd like to think that in years to come I can return to south Florida and relive those memories again. I wonder. And hope.

—Richard E. Bonney, Jr.

Black-capped Chickadee

Some people think behavior watching requires hours of waiting while crouched in a cramped blind or going on long treks that involve perilous bushwhacking. To dispel this myth we present to you the black-capped chickadee—a bird whose behavior can be observed all winter just by glancing at your bird feeder from the comfort of your own living room.

Many of the most fascinating aspects of chickadee behavior have been discovered through studies done at feeders. By placing colored bands on the birds' legs, researchers have been able to follow individual birds over many years. This research has made the black-capped chickadee one of the best studied of our common birds.

Many features of these discoveries can be seen at your own feeder. For example, you may have noticed that in winter chickadees seem more numerous and always move about in small flocks, whereas in summer they seem to disappear into the woods. This is actually evidence of the species' social structure. During breeding, from April to July, pairs of chickadees disperse into breeding territories of about 10 acres each. At this time the birds are very secretive and will be seen most often as individuals or pairs.

In late summer, the young disperse and all chickadees form small flocks of about 6 to 10 birds. Each flock stays in a feeding area of about 20 acres which it defends against nearby chickadee flocks. The flocks maintain the same membership until the following April when pairs again disperse to breed.

That is why throughout the winter you may have your own personal chickadee flock at your feeder. The flock will consider your feeder to be in its territory and may defend it from other flocks. Sometimes feeders are at the edge of several adjacent territories. In this case you may have several flocks all winter.

While watching chickadees at your feeders, you may have noticed that the birds tend to land one at a time; some birds even seem to wait their turn while others feed. This observation reflects another fact that researchers have discovered: the chickadees in a given flock form a hierarchy. The most dominant birds feed first and often displace less dominant members at the feeder.

This hierarchy is arranged by age and sex with adults dominant over juveniles and males dominant over females. In most cases the dominant male and female were paired during the previous season, and the winter territory is formed around their breeding territory. The rest of the flock is also paired, with the next most dominant birds of each sex pairing. Thus, a typical flock consists of about three to five pairs.

If you watch your chickadees as they fly away from the feeder, you may see two birds that associate more closely with each other than with other members of the flock. Researchers who have followed the fate of these pairs into the breeding season have found why the winter flock hierarchy is important. Only the top two or three pairs in each flock will defend breeding territories in the area; the lower ranking pairs will be forced out into marginal habitats where they may not breed successfully.

But the plot thickens: Careful study of color-banded individuals has revealed that certain unpaired chickadees move among flocks. These birds are called floaters, a misnomer since the term suggests they are shiftless and carefree. In fact, each floater has three or four flocks that it visits repeatedly each day. Within each flock it has a place in the hierarchy, usually near the bottom. In cases where a flock is visited by more than one floater, they also have a hierarchy among themselves.

Throughout the winter you may have your own personal chickadee flock at your feeder.

A floater's strategy is to wait for the death of a dominant member of its sex in one of the flocks that it visits. When this happens, the floater inherits the missing bird's mate and its dominant position in the winter flock; the next spring it gets the breeding territory that comes with its new rank.

Being a floater sounds pretty good and indeed it is. The only better position is to be a member of a dominant pair already because then you are assured of a breeding territory. The worst position is to be a low-ranking paired bird in the flock; your only hope of advancement is when both members of a dominant pair die at about the same time. Then you both move up in the hierarchy. Paired birds seem only to move up together.

Besides seeing evidence of chickadees' social structure at your feeder, you may hear many of their calls. With a little practice you can distinguish among several common calls and even interpret their meaning.

The best-known chickadee call is that for which the species is named. This call is most common during the months that the birds are in flocks. It is given by males and females, and may signal mild alarm, or function as a contact note that draws the flock together if it becomes dispersed while moving through its territory.

Recent research suggests that *chick-a-dee-dee* may be a very complex call, composed of four distinct parts, and a given chickadee may create numerous variations by omitting or repeating certain parts. Some researchers believe that each of these variations may have subtle differences in meaning.

Probably the most frequently given call in winter is the tseet-call. Listen for it as a flock approaches or leaves your feeder. It is a single, soft note given by male or female members of the flock as it moves about its territory. This call may function as an inconspicuous way for the flock to keep in aural contact as the birds look for food and watch for predators.

Another call you may hear at your feeder has been termed the gargle-call since it sounds like gargling or the phrase *tseedledeet*. It is given by males during aggressive encounters between members of a flock when there is a dispute at feeding sites, or between birds in different flocks during territorial skirmishes.

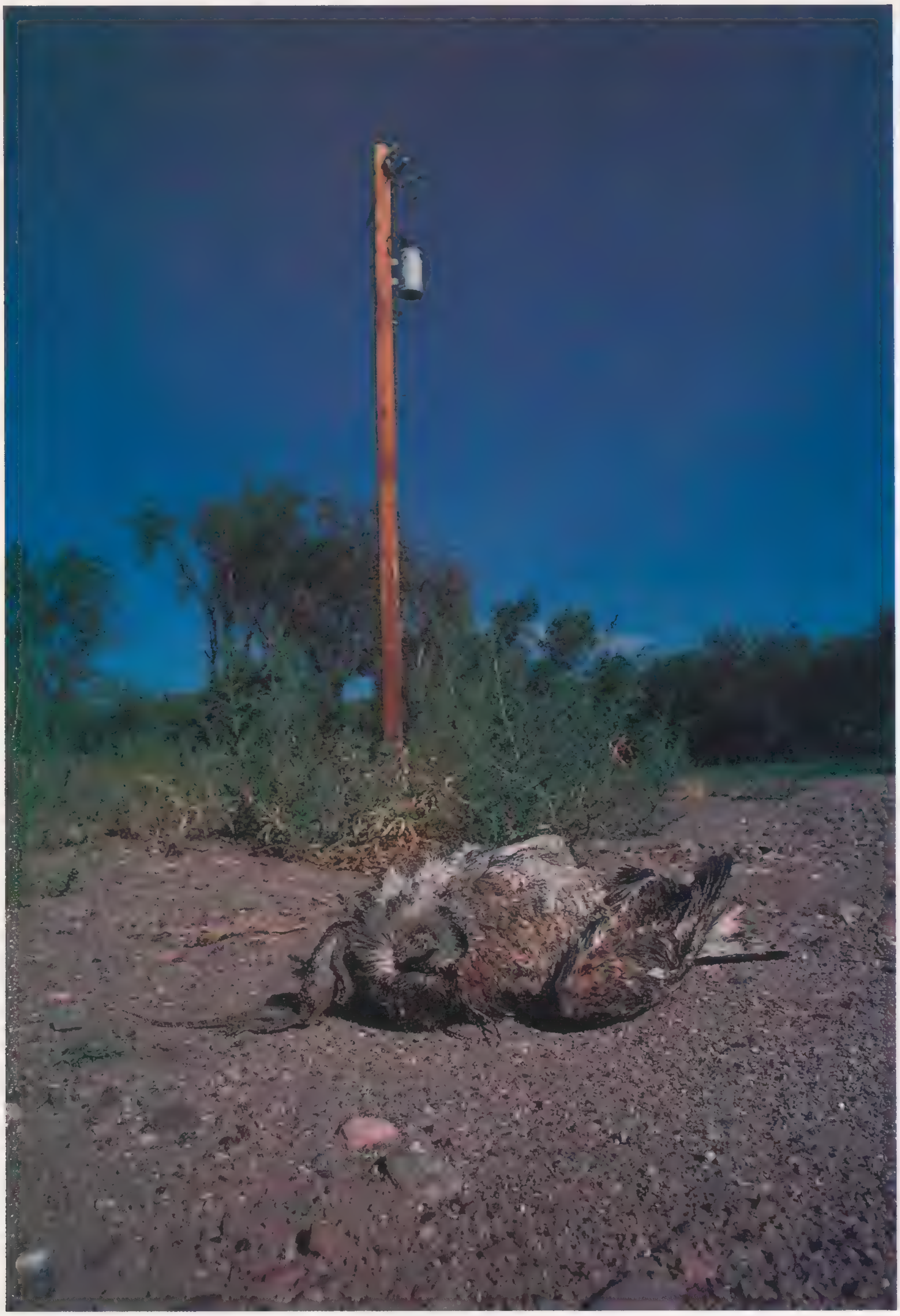
A fourth call, which you are most likely to hear in late winter and early spring, is the familiar two-note, clearly whistled *feebee*. A loud version of this is made only by males as they become less tolerant of other males and begin to defend their breeding territory. It is often answered by another male, drawing the two to a territorial border where they may chase each other, give the gargle-call, and then separate. This sound is a sure sign that the chickadee breeding season is about to begin.

—Donald & Lillian Stokes

Donald and Lillian Stokes are authors of Stokes Nature Guides and the newly published *Bird Feeder Book*.

KEN STEVEN (VALAN PHOTOS)

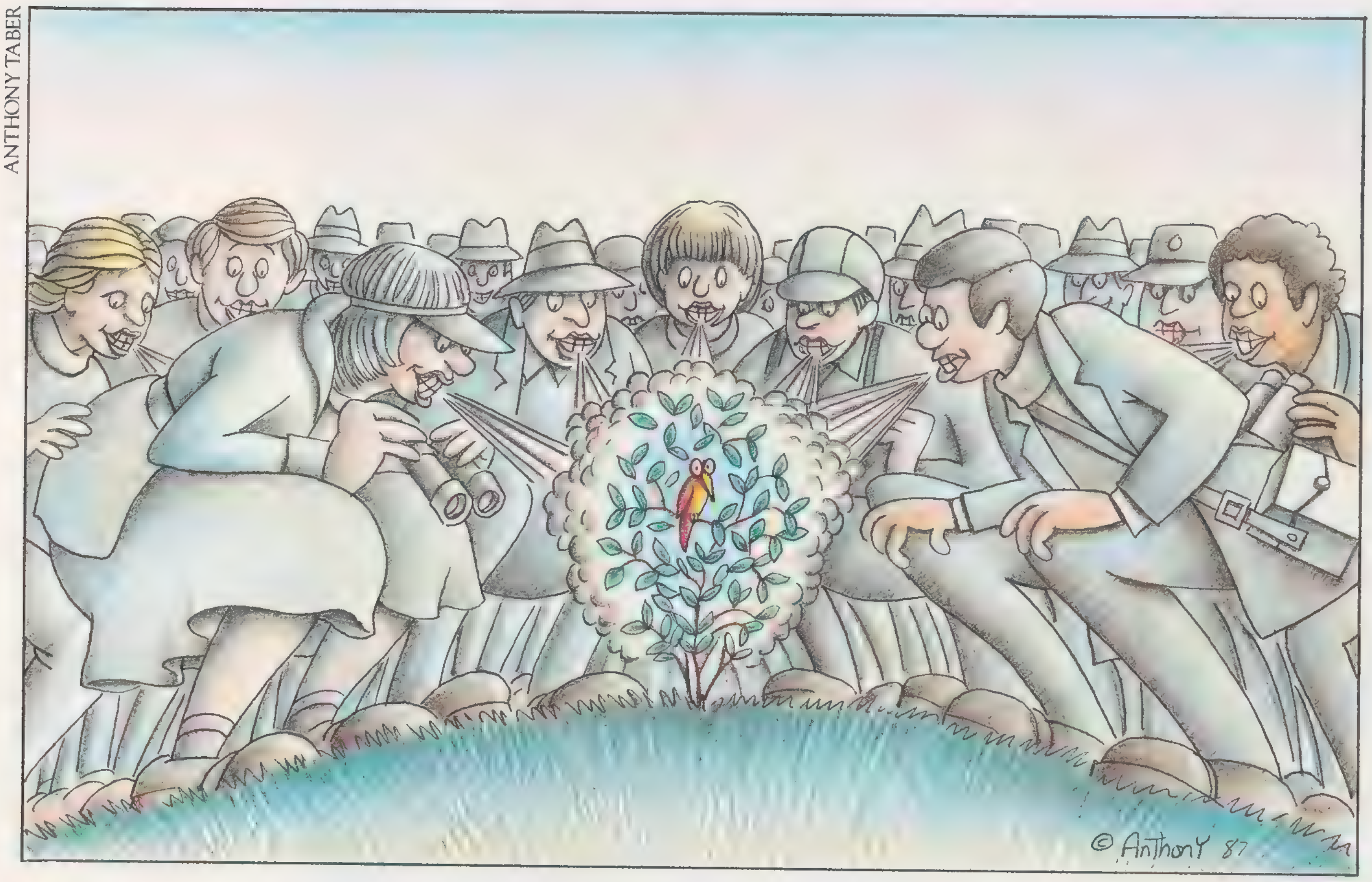
Studies conducted at backyard bird feeders have revealed the underpinnings of the black-capped chickadees' social structure.



MARTY CORDANO

Fatal Shock

Great horned owls are fearsome predators, but they're no match for transformers on high-voltage power poles. This luckless bird was killed when it perched near the transformer in the background. Owls like to perch near power-pole crossbars where they are less conspicuous than when perched in the middle of an open line. Unfortunately, crossbars with transformers are notorious owl killers; both ground and hot wires are attached close together at transformers, making it easy for an owl to touch both wires as it lands or takes off. A bird that touches only one wire is safe, but when it touches two wires at once, its goose is cooked.



ANTHONY TABER

The Art of Pishing

I'm a pisher. Some birders are, some aren't. Me? I pish. Couldn't bird without it. Pishing is an onomatopoeic term applied to the orally produced noises made by bird watchers in their attempt to lure songbirds out from the cover of trees and bushes. If this is not the definition you had in mind, then you were confusing pishing with something else.

There are pishers and there are pishers. Some pishophiles are fairly low key. They will step in front of a likely looking hedge, utter a timorous *pssssst* or whispered *shhhhh,* and wait. If vireo x or warbler y doesn't appear, they will slink away.

Most patrons of the art are more tenacious. They will wheeze and shush themselves into unconsciousness before admitting that a hedge is empty of aviformes. Often one pisher in full chorus will attract other pishers. It's not uncommon to see half a dozen pishers in full song all standing around a bush sounding like perforated steam pipes.

Why would a bird go out of its way to investigate a leaky steam pipe? Because pishing is alleged to mimic the generic alarm calls of assorted passerines—a bird's equivalent of S.O.S.

But does it in fact attract songbirds?

I posed this question to Dr. Harold Axtell who is to birding what Hammurabi is to law. Harold has made an exhaustive study of pishing and concluded that it will do one of three things: A. It will attract birds. B. It will scare birds away. C. It will do nothing.

Why would a birder bother with a technique that offers less than a coin-toss chance of success? Some do it for the mastery it gives them over the birds of the air. Some do it out of sloth—the only alternative is pursuing the bird. Most do it because when it does work it works very well.

Chris Abrams, a British friend, became adept at pishing during a trip to the United States. The British have never practiced the art because it elicits about as much response from Old World birds as it does from a Stonehenge pillar, and besides, stealth and quiet are key components of United Kingdom birding etiquette.

Last fall, back in the U.K., Chris joined a largish band of British birders. The binocular-toting throng was wrapped 70 across and 60 deep around a bush waiting for the appearance of an American visitor, a black-and-white warbler which was alleged to be hiding within.

The silence was so profound some professed to have heard the bird's heartbeat. Chris realized this might be the perfect time to practice his new trick, so after waiting a decent interval he cut loose with a noise that some likened to a 90-pound Siamese with a lisp, others to a steam engine built to government specs. Half of those present rushed to save a comrade they assumed was held in the grip of a seizure; the other half rushed to kill him. Luckily for Chris, the warbler popped to the top of the bush and sat until everyone got bored, which for British birders is a long time.

Pishing entices some species out of the bushes better than others. Black-and-white warblers, chickadees, and juncos respond nicely. Sedge wrens put their alulas in their mouths and sulk at the first little *psst.* Trying to arouse a Connecticut warbler is like pishing into the wind.

Occasionally pishing works too well. While leading a group in Cape May, New Jersey, one morning, I stepped in front of a cedar and broke into my best imitation of a deranged titmouse. A bleary-eyed yellow-rumped warbler burst to the top of the bush and in .000367 seconds went from 0 to 60 miles per hour in the company of a very surprised but not displeased merlin.

Birders will argue tirelessly about the merits of pishing—why it works for some species and not for others. Whether or not it stresses birds. Whether it causes sterility or brain damage.

One point in pishing's favor is worth noting: even if all the strange, rude, and embarrassing noises that constitute pishing have no effect on birds, it's a fair substitute for patience. It forces a body to stand in one place. And, over much of the world, if you stand in one place long enough, a bird is bound to appear. —**Pete Dunne**

Come birding on the spectacular moors and cliffs of Fair Isle, Scotland in June 1988

Photos: David O. Johnson

Fair Isle is a most unusual bird sanctuary, encompassing the whole of an island in the North Sea off northern Scotland. Now MOT and the Laboratory of Ornithology are sponsoring—in June 1988—the tour of a lifetime guided by Richard ffrench, MBE, to this unique bird sanctuary.

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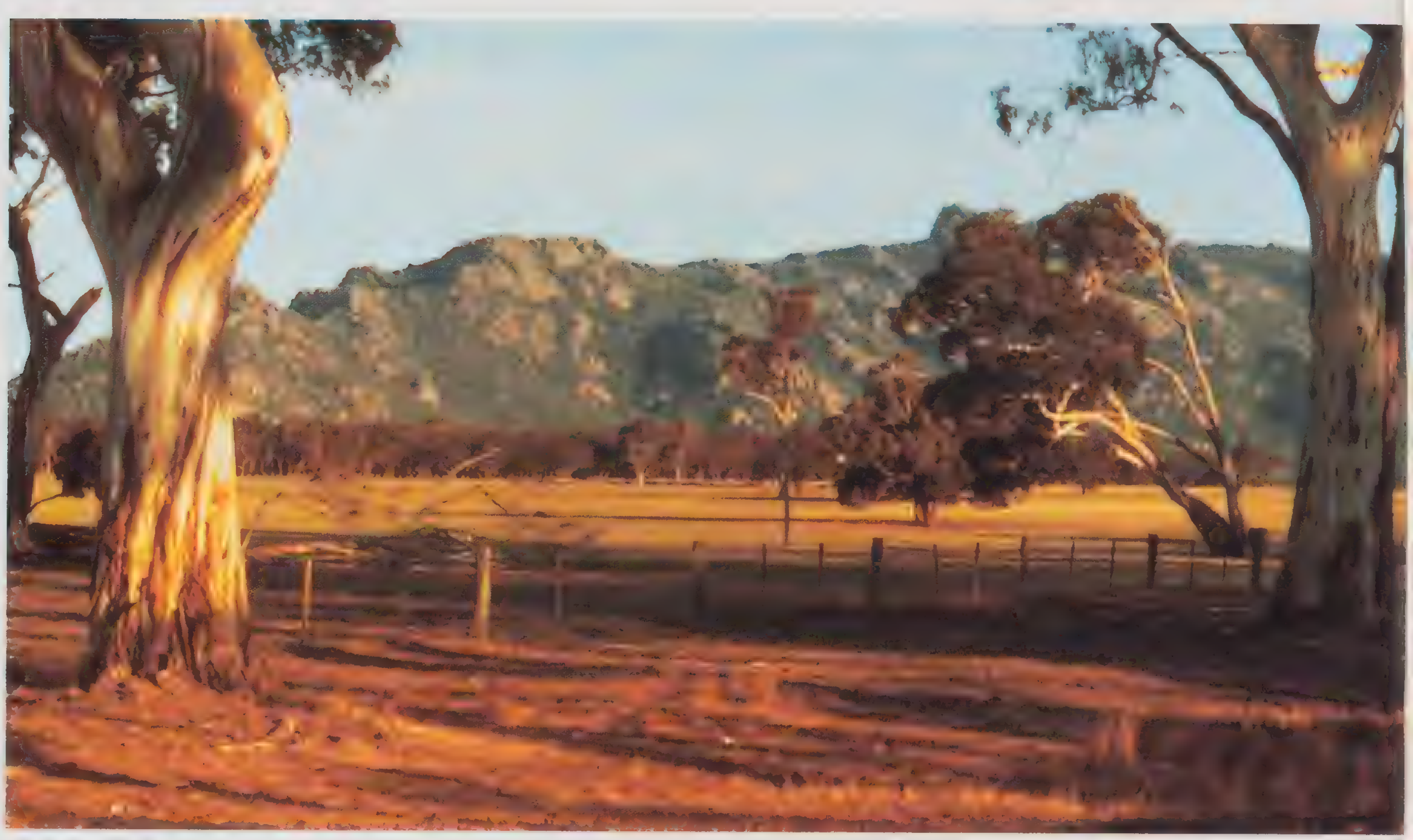
THE LIVING BIRD

Quarterly

Spring 1988

Queensland Is for Koalas... kookaburras, cockatoos, and honeyeaters



Photos: Australian Tourism Commission

1988 is the year of Australia—the most popular foreign destination for naturalists, bird watchers, and tourists.

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THE LIVING BIRD *Quarterly*

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Front Cover: Young great blue herons on their nest in southern Florida. The birds spend about two months in the nest, eating, squabbling, and testing their developing wings, before making their first awkward flights. Photograph by Margarette Mead. Our front cover was printed thanks to a generous gift from Barbara B. Smith.
Back Cover: Anhinga shows the proper way to swallow a sunfish, Everglades National Park, Florida. Photograph by J. H. Robinson.
Right: The Sapsuckers at the World Series of Birding, 1985. Photo by Paul Solomon (Wheeler Pictures).

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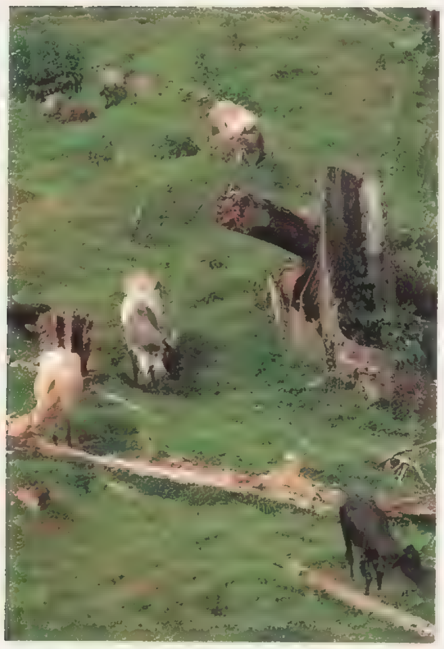

BILL GABRIEL

Raising beef in Costa Rica

Whoppers, Double Whoppers, and Whopper Juniors are no longer made from tropical hamburger: Burger King has stopped buying beef raised in Central and South America. According to a company spokesman, the fast-food chain halted its tropical beef imports partly in response to a national consumer boycott organized by the Rainforest Action Network (RAN), a nonprofit conservation coalition based in California. RAN initiated the boycott in 1986 because conversion of rainforest to cattle pasture is the leading cause of deforestation in Central America, and Burger King was one of the largest purchasers of Central American beef.

RAN, applauding Burger King's action, has called off the boycott and is now trying to determine which other companies still purchase tropical beef, which is slightly cheaper than beef produced in the United States.

Two Atlantic puffins sporting leg bands were seen on Seal Island National Wildlife Refuge, Maine, last summer. According to Steve Kress, director of the National Audubon Society's Puffin Restoration Project, the birds were the first hint of success in efforts to reestablish a puffin colony on the coastal island. The original colony, Maine's largest, was extirpated by hunters in 1887.

The two banded birds were among 100 chicks transplanted to Seal Island from Newfoundland in 1984 and reared in artificial burrows. After fledging, the birds left the island to spend their first few years at sea. Kress hopes the surviving birds, which are now old enough to breed, will nest on Seal Island instead of their native Newfoundland. If all goes well more banded birds should appear on the island this summer.

Kress is a longtime Laboratory of Ornithology Associate who began his puffin work in 1973. His efforts have already led to the 1981 restoration of a puffin colony on Eastern Egg Rock in Maine's Muscongus Bay. And last year his diligence paid off in another way when he received a prestigious international conservation award, the Rolex Award for Enterprise, consisting of a gold watch and 50,000 Swiss francs (about $35,000) to be used for creating new seabird colonies.

Atlantic puffins

TIM FITZHARRIS

Birding is a great hobby for people who can't see, says a booklet recently published by the National Library Service for the Blind and Physically Handicapped. *Birding: An Introduction to Ornithological Delights for the Blind* explains how visually impaired persons can use their ears to become good birders. The booklet also lists sources of commercial birdsong recordings and a selection of recorded and braille books available in regional libraries. The free booklet is available from the Reference Section, NLS/BPH, 1291 Taylor Street NW, Washington, DC 20542. (202)287–5100.

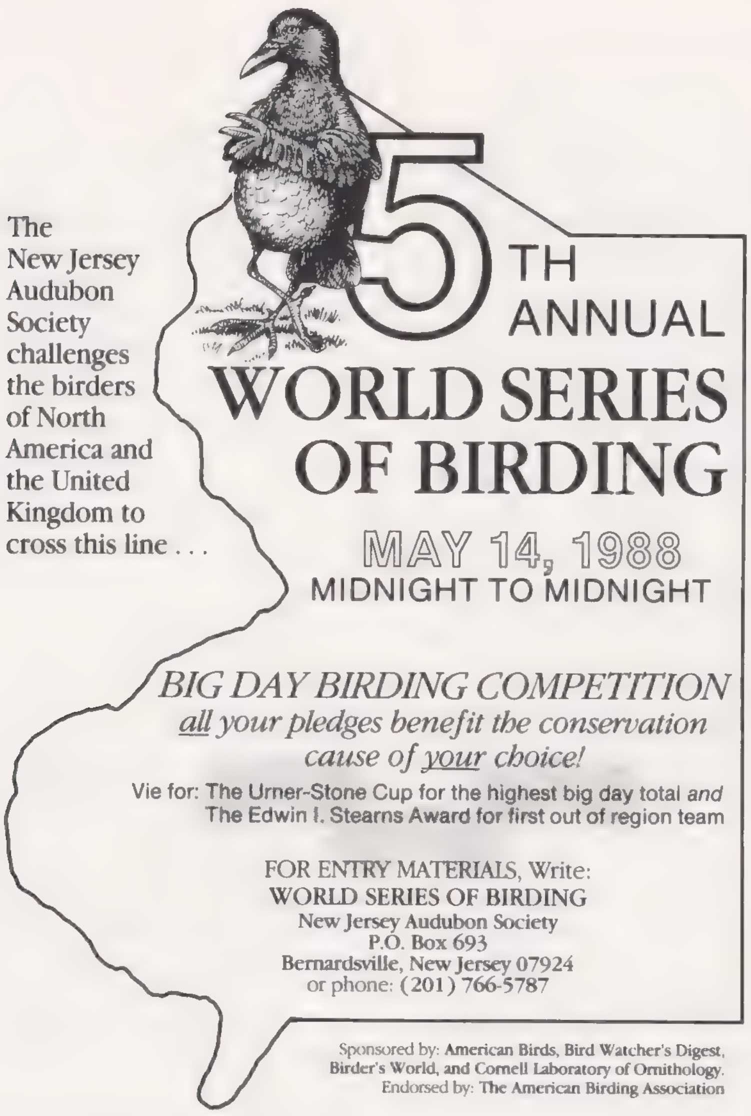
White-rumped swiftlets in Australia have a novel approach to incubating their second egg: they leave the chore to their firstborn. Two biologists from Massey University, New Zealand, have discovered that the adult swiftlets incubate their first egg themselves. But they don't lay their second egg until the first nestling is 32 days old. The young bird then keeps the egg warm until it leaves the nest, when the parents resume incubation duty.

According to *BBC Wildlife*, the biologists— Edward Minot and Michael Tarburton—speculate that the unusual breeding behavior results from erratic supplies of the swiftlets' food, flying insects. Because the insects are abundant only after rainstorms, the birds would be hard pressed to feed two nestlings at the same time. And the nesting season isn't long enough for them to raise two successive single-egg clutches. The swiftlets, therefore, have evolved a system enabling them to raise two young in a short time without ever having to feed both at once.

A semipalmated sandpiper has set a new record for high-speed, long-distance migration: 2,800 miles in four days. The bird was banded at Plymouth Beach, Massachusetts, and shot four days later in Guyana, South America, by a hunter who sent the band number to the U.S. Fish and Wildlife Service. When banded the little speedster weighed 24 grams—just under an ounce!

Last fall bird banders from the Manomet Bird Observatory made an astounding capture at Duxbury Beach, Massachusetts: they netted a rare shorebird known as Cox's sandpiper. The species was discovered just six years ago in Australia and had never been seen outside that country or China.

Photographs taken by the Manomet researchers before



The New Jersey Audubon Society challenges the birders of North America and the United Kingdom to cross this line . . .

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the bird was released indicate that it was a juvenile, meaning that the vagrant was fresh off its breeding grounds. Ornithologists suspect these are in the Soviet arctic, suggesting that the bird flew to Massachusetts all the way from Siberia.

Cox's sandpiper looks much like the pectoral sandpiper but has a longer, darker bill and lacks the pectoral's well-defined breast markings.

AROUND THE LAB

The Peregrine Fund, founded by Cornell University professor Thomas Cade and based at the Lab for the last 16 years, has moved its operations to the new World Center for Birds of Prey in Boise, Idaho. Since 1973 the fund has been breeding peregrine falcons in captivity and releasing them to the wild in an effort to restore the species to areas where it was extirpated by DDT just a few decades ago.

Last summer the fund released its 2,000th captive-bred peregrine to the wild and this summer will conclude releases in the eastern United States, where about 50 pairs of the birds are breeding once again. Now the fund will direct its efforts to restoring the species in the West.

The Lab has a new telephone system and all Lab phone numbers have been changed. The new number at the main desk is (607)254–BIRD. If you need to speak with a specific Lab department, please call the main desk. A friendly voice will give you the appropriate number and transfer your call if possible.

More than 4,000 bird watchers are participating in Project FeederWatch, the Lab's newest bird-counting project. Observations of the numbers and kinds of birds at participants' backyard feeders should help answer some questions about winter bird populations, such as which weather conditions cause birds to come to feeders, and which populations make large-scale winter movements.

Some initial findings from the first winter will be published in the May issue of *Birdscope*, the Lab's research newsletter. Sponsored by *Bird Watcher's Digest*, Project FeederWatch is being managed in Canada by Ontario's Long Point Bird Observatory and is coordinated by Erica Dunn, who ran the Ontario Bird Feeder Survey for 10 years.

White Elephants Wanted

What is a white elephant? Anything that is of little use to its owner—including art, rare books, vehicles, computers, vacant lots, even unused vacation homes.

What good is a white elephant? As a gift to the Lab, it can be sold and the proceeds used to benefit any of our programs. And you'll benefit, too, from immediate savings on income taxes.

Turn your white elephant into a gift for you and for the Laboratory. Call or write: Scott Sutcliffe, Director of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607)254–2424.

FROM THE DIRECTOR

As director of the Cornell Laboratory of Ornithology I probably shouldn't admit this, but I'm a novice birder. Common birds give me no problem, but sparrows and sandpipers leave me confused. I find this frustrating. If I don't know what a bird is, how can I learn more about it? The bird's name is the key to learning about its behavior and ecology and, eventually, its conservation.

We have lots of experts here who can set me straight when we're out in the field together. But what about when I'm alone? I need a field guide I can trust. Which one?

Field guides have proliferated wildly in the past few years. When my father watched birds as a youth there was one option: Chester Reed's series of pocket-sized *Bird Guides*. When I was young there was still just one choice, Roger Tory Peterson's *Field Guide to the Birds*. Even in the 1970s only two or three guides were available. Today's birders can choose from seven different guides or sets of guides to the birds of North America. And that number doesn't include field guides to groups of birds, such as hawks or shorebirds, that have recently been published.

So beginners like me are now confused not only about the birds but also about the field guides. Some of the current guides are simple and easy for fledgling birders to use. Others are better suited for experienced birders. Some are so comprehensive they can lead you to panic as you flip frantically through the pages under the watchful gaze of a mystery bird.

To help you choose, we've asked Kevin Zimmer, a well-known birder and tour leader from California, to rate the various books according to a number of criteria. His guide to the guides starts on page 20.

As for me, I've picked one of the simple ones. Spring is coming. I must start working on those sparrows!

CHARLES WALCOTT, Executive Director

I Become a Bander

During the past year I have become immersed in birds—steeped in birds—to a degree I have never experienced before.

Sure, I've done a lot of birding since I became hooked in the sixties, but never with such sustained intensity and fascination as recently. The reasons for that are a bit complex. Don't get me wrong; I've always enjoyed my birding—the excitement of the chase, the beauty of the birds, the curious and sometimes lovely behavior of flocks, the magical quality that has a bird here one minute and nowhere to be seen the next. But almost from the beginning, after a weekend of high-powered bird finding and bird watching I've often felt something was missing—that I had been only a bird consumer and that in order to complete the experience satisfactorily I must do more.

More has meant making something of the experience—writing about it or doing something else about the birds through conservation and research, because birds—the source of pleasure for me—are in trouble everywhere and need our help. Gradually most of my "hobby" has come to have a larger purpose than simple recreational enjoyment, and I have had less time to spend with birds, because I have been spending time on writing, research, and conservation. One of life's little paradoxes.

Recently a few members of our local bird club established a bird-banding station at Flanders Nature Center in Woodbury, Connecticut. I was part of that crew. There are a lot of unanswered questions about bird distribution, behavior, and migration in our area, and this project seemed to offer me an opportunity to combine birding with research. Last year we banded birds from early spring into late fall, usually at least one morning a week.

I was a neophyte, but I had done some banding before in the course of writing a book about the ornithological research station on Great Gull Island, at the entrance to Long Island Sound. What I remembered most from the banding on Great Gull was the birds alive in my hands. As I went to sleep at night on the island, after an evening of trapping and banding terns, I could still feel the birds I had held, feel moving against my palms and fingers the bone and muscle and plumage of beautiful, vigorous coplanetarians. I realize now that I had already begun to uncover what is—for me, at least—a key part of the experience: getting to know birds as individual living creatures, not as optical images that match or don't match certain field-guide images.

D. E. KRIGER

Bander Harwood and black-capped chickadee. Kinglets and many wood warblers lie resignedly in the mist net. But chickadees usually wind themselves into a snarl.

Like most banding operations aimed at catching small birds, ours relies mainly on mist nets hung between tall poles. These nets are usually about 12 yards long and 2½ yards high and are made of mesh so fine that birds apparently don't see them. A banding friend declares she doesn't believe birds can be so blind, no matter how fine the mesh; she says she suspects that any bird that flies into a net was looking over its shoulder at the time. But under certain conditions, particularly in low light and against a background of vegetation, the nets do become virtually invisible, and even the humans who put them there sometimes walk into them.

Each net is divided by horizontal strings into five long, baggy nets, or trammels, one above the other. The bird flies into one of these trammels and is enveloped in mesh. Then it begins to express its personality. Different species behave remarkably differently under the stresses of netting and banding. Some—for example, many wood warblers and kinglets—hit the net, tumble into the belly of the trammel, and just lie there, bewildered or resigned, waiting for whatever is going to happen to them next. Disentangling such a bird from the net is usually easy. Then we stow it in a cloth bag, carry it to the banding table, remove it from the bag, band it, take measurements and weight, examine it to determine its age, sex, and condition, and release it—all without much fuss from the bird.

Other species, however—chickadees and tufted titmice, for instance—usually struggle and somersault in the net until they have wound themselves into horrid snarls that tax the skill and patience of net clearers. Furthermore, while you are trying to disentangle one of them from the mare's nest it has created, it hammers and bites your fingers—hard enough to hurt, believe me—and flails around, retangling itself. It then bites the bird bag, bites the bander, drills and bites the person letting it go. After you have handled a few of these birds your understanding of their character is greatly enlarged: they are persistent, spunky creatures.

Being bitten educates the bander about other characteristics as well. The cardinal or grosbeak or purple finch you see shredding the hull of a sunflower seed between its mandibles appears to be munching effortlessly, and when such a bird, while being taken from a net or a bird bag, manages to grab a piece of your finger, you are instantly, painfully equipped to appreciate why opening a sunflower seed between the mandibles looks so easy. How strong your jaw muscles are, Mr. Grosbeak! The big finches can leave pinch marks that remain visible for hours.

I could still feel the birds I had held, feel moving against my palms and fingers the bone and muscle and plumage of beautiful, vigorous coplanetarians.

The behavior of individuals varies within species as well. Young rose-breasted grosbeaks and chickadees, for example, don't seem to be nearly as aggressive as their elders—thank goodness. Some catbirds are noisy, some aren't; some squirm and bite, others are placid. A catbird is more than a catbird in some respects: it is itself.

That individuality is central to the value and purposes of banding birds. A great deal of information about the life histories of bird species—longevity, migration routes, fidelity to territory, breeding history, post-breeding wandering, sequence of plumages and other physical development, and much more—can only be learned by collecting information about many individuals. The only way to follow the travels and development of individuals over long periods of time is to mark them in a way that permanently identifies them. So each aluminum band that we fit on a bird's ankle carries its own unique number, and each time the bird is caught its number is recorded along with details about the circumstances and the bird's condition.

After a while, that information begins to add up to better and better life histories of the species we band. We are able to sort out typical development and behavior of birds we call gray catbirds and dark-eyed juncos and American robins. But we also uncover details that fall outside what we think is the average for a species—the bird out of its normal range, let's say, or the individual at a stage of physical development ahead or behind most of its brothers and sisters. Often it seems that we banders, investigating instants of time in the lives of single birds and seeing such divergences, are peering through a window into the evolutionary process.

Banding has added a great deal of knowledge in the last fifty years, and knowledge is crucial to bird conservation. Yet science remains remarkably uncertain about most bird species. Banders constantly refer to thick notebooks of published and unpublished observations to help them determine the age and sex of the bird in the hand and even to identify some of the birds they catch, and those resources reveal many more questions than answers, even for some of the commonest species. Take blue jays, for example. A U.S. Fish and Wildlife Service sheet notes that much information has been collected about sequences of plumages in blue jays but that the total picture still is confused, because plumages vary from region to region. More information on the plumages of blue jays of known ages is badly needed to help sort out regional differences.

JOE DISTEFANO (PHOTO RESEARCHERS, INC.)

By investigating instants of time in the lives of single birds, banders peer through a window into the evolutionary process.

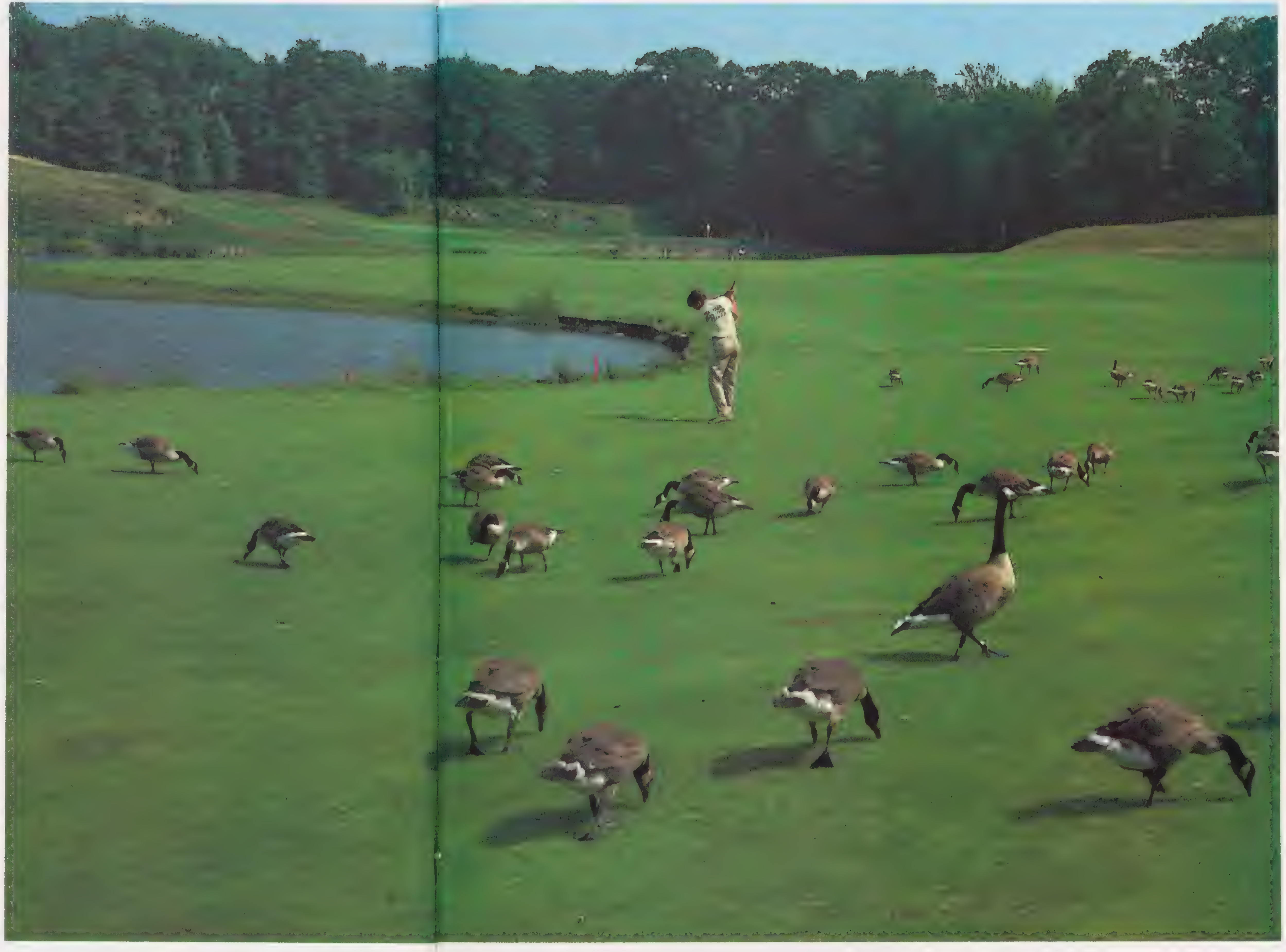
So through banding I can spend all the time I want with birds and never run out of questions I can help answer—while connecting with the cycles and hazards of birdlife to a degree inaccessible to me before. This spring, when we begin to find birds in high breeding condition, some of them will be actually hot to the touch. Most females and some males shed down feathers from their bellies and develop bare-skin brood patches that become swollen with blood vessels, which raise the temperature of the skin against the eggs during incubation. Before long we will catch the first pale-eyed fledglings, spiky with feathers still in the sheaths. By autumn these young will be wearing adolescent plumages and have put on enough fat to get them started on migration.

We'll catch some birds that are injured or ill, and perhaps we'll be lucky enough to see a few of them get well. That has happened. At Flanders in 1986 we banded a catbird that had a tumor on the outside and inside of its lower mandible; we caught it again last spring, and the tumor had disappeared. We were delighted: you might say that an acquaintance we had worried about had recovered from a life-threatening condition. I think that capsulizes the connection of the bander to the coplanetarian in his hand.

—Michael Harwood

Too Much of a Good Thing?

GREGORY G. CHASKO AND MICHAEL R. CONOVER


GREGORY CHASKO

The fantastically successful Canada goose has moved from the country into city and suburb, leading those who must clean up to refer to the bird as a 20-pound starling. When goose droppings cover a golf course, they add a new dimension to the game.

Few who have heard the raucous honking of a flock of Canada geese passing overhead can remain unaffected. The cacophony created by southbound birds is a harbinger of fall which engenders a feeling of wildness.

Unfortunately, these birds evoke a different emotion in a farmer who discovers that his newly planted rye is considered gourmet by the geese. Or in the suburban homeowner whose yard is befouled by goose droppings. Or the Connecticut high school football team that has to play all games away because there are too many droppings on the home field.

As wildlife biologists we are caught in the middle of changing attitudes. The bulk of our phone calls about geese used to come from homeowners delighted by a pair on the backyard pond. Nowadays they're from disgruntled people wanting advice on how to get rid of the birds.

How did this symbol of wildness get so numerous and well adapted to urban environments that it has become a nuisance?

It started with the Migratory Bird Treaty Act of 1918. This treaty between the United States and Canada protected many migratory birds, including Canada geese. Prior to this time, geese had been the target of uncontrolled shooting. The act restricted the harvest of migratory birds and eliminated other population-decimating factors such as shooting birds during the breeding season.

In the 1930s the goose population got another big break when federal regulations outlawed live decoys. Hunters were forced to release the small flocks of captive geese they had been using to attract wild birds into gun range. These captive birds had lost most of their fear of humans, and when they were released around towns and cities, they readily adjusted and became year-round residents.

Finally, in the 1960s and 1970s, wildlife managers in many central and northeastern states established additional resident flocks—geese that spend winter as well as summer in the same area—using a nonmigratory subspecies known as the giant Canada goose. This subspecies was selected because few people wanted to spend time and money establishing flocks that would migrate far from the area.

Although most birds were released on marshes in rural areas, these adaptable geese did not always stay put. They quickly found nearby locations where food was superabundant and predators few. The geese had discovered vast expanses of the highly nutritious grass called lawns. Ah, Suburbia! Also appealing from the geese's perspective were the ponds that landscapers had interspersed with the lawns. And the birds found people they could count on all year to provide handouts of bread and corn.

These suburban populations of giant Canadas have done more than just survive in their new surroundings. They have thrived. In our studies in Connecticut we found their breeding success to be very high: each pair laid an average of 5.6 eggs per clutch and fledged 4.5 young per year. From our surveys we estimate that in the last 30 years Connecticut's resident giant Canada goose population has increased from 100 to 9,000 birds.

Still, most wildlife managers were not immediately concerned about the effects of these exploding populations. Bird watchers enjoyed the geese in their backyards and some birds provided opportunities for hunters.

Then we started hearing more and more complaints from water companies, homeowners, park managers, and golfers. Most complaints were about large unsightly goose droppings. To say the least, when these objects cover a golf course, they add a new dimension to the game. Their daily removal from fairways and greens is a serious maintenance problem for golf course superintendents. Park and beach managers also consider goose defecation a serious problem because of the potential health risks to barefooted children. In fact, some beaches, sports fields, and parks in Connecticut have been closed temporarily as managers struggle to get rid of the geese. Some homeowners are afraid to let their children play in the backyard; others say picnics are not what they used to be.

Another problem occurs when goose droppings fall

BHL

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Canada geese used to head south each fall in search of open water. Now, city geese hang around all year.

JOSEPH STANSKI (MORNING STAR PHOTO)

into lakes and ponds. When hundreds of geese spend months on the same lake, their droppings can contribute significant amounts of organic matter and phosphorous and nitrogen to the aquatic system. These nutrients can lead to algae blooms during the summer growing season. Such blooms are not only unaesthetic, they also degrade water quality. When the algae die and decompose they use up oxygen vital to the survival of all aquatic organisms.

Another problem can be caused by coliform bacteria in goose droppings. Elevated coliform levels in water are indicative of fecal contamination. Usually the source is human or livestock. In Connecticut, however, geese have sometimes been implicated as the cause of high coliform counts. In the most dramatic example, coliforms from goose droppings polluted shellfish beds.

Our experiences with nuisance geese in Connecticut made us wonder about the extent of the problem in other parts of the United States. Since geese like to feed on golf courses, we surveyed 12 golf course managers from each state east of the Mississippi River in 1982 and found that goose problems were widespread. Forty-two percent of the managers reported that geese were present on their property, and of these, 62 percent considered them a nuisance.

Although our survey was limited to the East, nuisance geese are not. Flocks also occur in Canada and the central and western United States. And the problem seems to be growing worse. Among the golf course managers we surveyed, more than half reported that geese had become a nuisance within the last five years.

What are the solutions to nuisance goose problems? Techniques used by farmers to keep migrant geese out of agricultural areas do not work well on urban birds. The scarecrow is a traditional way to frighten unwanted birds, but urban geese are more apt to crowd around a scarecrow looking for a handout. Similarly, firecrackers, blank guns, and propane-powered cannons, which often frighten country birds, are ignored by city birds which interpret the bang as just another car backfiring.

Capturing and relocating nuisance geese has been a technique tried recently by federal and state wildlife agencies. The birds are captured by wildlife personnel in late June and early July when they are molting and incapable of flight. They are then transported to states wishing to establish resident flocks on remote wildlife management areas. In Connecticut in the 1970s and 1980s we sent hundreds of "golf course geese" to West Virginia and Maine.

Although this solution initially appeared to be ideal, it is not. It requires a lot of manpower, time, and expense, so only a limited number of birds can be removed each year. Experience has also shown that depopulated sites are rapidly reoccupied by neighboring geese and that some transplanted birds quickly return to their original homes. Thus, benefits are usually only short term. The future of this program is also in jeopardy because fewer and fewer states are willing to accept captured geese, while more and more wish to export them.

Fowl Salvo

To say that super-wealthy Greenwich is for the birds might seem to be . . . well, almost revolutionary.

After all, Greenwich is Greenwich, the well-heeled town where the average price of a home is more than $600,000 and casual conversation often includes the words Dow and Jones. But Greenwich is for the birds, and Robert C. Brown sums it up quite nicely.

"This is goose city," he says. Officials say the town is home to thousands of geese, but nobody is sure exactly how many.

Brown is the environmental health director in Greenwich, and the geese he refers to are Canada geese, those big, long-necked creatures that honk as they fly and traditionally have inspired writers to superlatives during the migratory seasons when the birds fly in beautiful V formations.

Recently, though, geese have inspired superlatives only in invective because many have turned into pests.

They have chosen simply to hang around places—such as Mirror Lake at the University of Connecticut campus in Storrs—where they loaf and get handouts of food.

And wild geese have dealt Greenwich a double whammy, Brown says. The first began several years ago when some geese started hanging around Byram Park, looking for handouts and making no pretense of good manners. The second is more recent. The birds have begun to pollute shellfish beds on the Greenwich coast—beds the town had worked hard to clean up. At Byram Park on Long Island Sound, the geese are downright grabby.

"A couple of years ago it got so bad they'd take sandwiches right out of your hand," says Brown. "They scared a lot of people. They didn't hurt anyone, but they can look pretty threatening."

The thing about Canada geese is that it is against the law to hunt or kill them.

Brown flipped a document across his desk. "This is why," he said. The document was a 1918 agreement between the United States and Great Britain ensuring protection of migratory birds.

"But a lot of people think this is out of control now," he added, leaving no doubt that he is one of those people.

"This is a new breed of Canada goose. It's known as a nuisance Canada goose. It's just a scavenger."

Whether a goose is a regular, old-fashioned, proud, migrating one or the new nuisance variety, it is a prodigious manufacturer of droppings. One biologist sums the big bird up thus: "The goose is an eating and defecating machine."

When Canada geese drop in, so to speak, it is a time to walk with great caution, something at which the people who frequented Byram Park became quite expert. Frank H. Keegan, the town's director of parks and recreation, says that during the past several years, the geese have competed with people for the sandy area at the shore-front park—and mostly have won.

"It's like guerrilla warfare," says Keegan, an ex-Marine who enjoys tossing off one-liners about his war against the birds, which he believes are totally without redeeming social value.

"They're like in-laws. They drop in to visit and they never leave."

"They're not even frequent flyers. They've got so lazy they won't even fly into Byram Park. They swim in and take over. It's like the attack of the killer tomatoes."

The geese, he adds, are actually a townwide problem—"every golf course, every pond, they're all over, thousands of them"—but the battle is concentrated at Byram Park in warm weather because the birds have become so numerous and bold.

"We've tried everything. We have a little cannon and we'd fire blanks over their heads, but then they got used to it and looked forward to it.

"We bought a little fence with a small electric charge to get their attention. One would jump on it and the others would run over him into the park. I tend to think they're smarter than us. And I think they're winning."

Right now, the geese pretty well have the shorefront park to themselves, but as summer comes, Keegan says, he will be back out—cannon, electrical fence and all—trying to regain a beachhead. The battle for the beach, however, has been eclipsed by the newest development, or double whammy, from the geese. Another bunch of them are polluting Greenwich Cove.

"This is a new front," Brown says.

What happened, he says, is that after a quarter century it appeared that Greenwich had won its war against water pollution, but now the fowl are even fouling that up. Greenwich once had very active shellfish beds along its shoreline, Brown says. "There was a lot of commercial and recreation use. It's a good place for clams and oysters."

However, in 1961, the state ordered the town to close the beds to fishing because of man-made pollution, chiefly from a sewage pumping station on the north end of Greenwich Cove that sometimes allowed raw sewage into the water.

In the past several years, Brown says, the town has spent millions of dollars for a new system. "We've got sort of a model system now, and the water quality had improved dramatically," he says.

There were such high hopes that the shellfish beds would be reopened—particularly along Greenwich Cove, because there is an abundance of shallow water there—that the local shellfish commission was reactivated and Brown started taking samples of water from 23 locations off the Greenwich coast.

He was more than somewhat dismayed when he found high counts of pollution in Greenwich Cove and it seemed to be from waterfowl droppings flushing into the cove from Longmeadow Creek after heavy rains.

"But I just couldn't believe that there were enough waterfowl in the salt marshes along the creek to do that much damage."

He decided to investigate, and now is almost sorry he did. He found what he describes as a "terrific population" of ducks and Canada geese in the marshes. What is he going to do about this?

"We're changing our plans," he says, not very happily. "We'll leave the geese in the marshes. That's their native habitat. We'll keep the cove closed to shellfishing and see if we can open up some beds out further."

In brief, the geese have won the Battle of the Cove.

There are just some things money can't buy, even in Greenwich.—Bill Ryan, *The Hartford Courant*, Hartford, Connecticut, March 16, 1987

Greenwich Seeks to Prod Geese Into Leaving Beach

By DIRK JOHNSON
Special to The New York Times

GREENWICH, Conn., May 8 — They continue to eat what they please and generally make themselves at home, despite being insulted, chased and fired upon by cannons.

Some unwelcome visitors, it seems, never get the hint.

The pesky Canada geese, nemesis of the barefooted beachgoer, have been sunning themselves as usual at the Byram Park beach.

But this week, they got a surprise. Town officials erected a low-amperage shock fence, the sort used by livestock farmers, around this popular site for sunbathing and waddling, as an electrical way of telling the geese to go away.

"We think of it as a behavior-
ification program," said
erick Walters, chief of
hes and marinas in the Town
enwich. "It's kind of ironic,
eing 'Be Kind to Ani-

ends a shock
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where.

Some residents fear the bir
will simply fly over the fence.
officials theorize that the Ca
geese — grown fat because
no longer migrate as they
— are not in any condit
fence-jumping.

'Battle for the Beach'

But in this "battle for
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Reprinted from *The Hartford Courant*, March 16, 1987. Used by permission. Photo by Jack Swenson.

JACK B. HUHNERKOCH

This tranquil scene, far left, conceals a potential threat to human and aquatic health. Goose droppings cause algae to bloom and bacteria levels to rise. Meanwhile, people continue to provide tempting handouts.

Nuisance flocks cannot be controlled easily by hunting either; the birds spend much of the year in densely settled areas where hunting is not feasible. But some potential for controlling the nuisance birds in New England could be realized by expanding hunting in late winter when ice-up of inland waters often forces the geese to seek open water along the coasts where hunting does occur. Liberalized harvests late in the season should have a minimal impact on migrant geese, which usually will have flown farther south.

This experimental approach is being tested in coastal Connecticut and Massachusetts, where the U.S. Fish and Wildlife Service has extended the goose season from January 31 to February 5. In addition, from January 15 on, hunters are allowed to bag five geese per day instead of the usual three.

Another possibility for increasing the harvest of resident geese while limiting the impact on migrants would be to harvest birds early in the fall, before migrants arrive. Michigan has taken this approach and opened its goose season as early as September in some parts of the state to direct harvest pressure at nuisance resident flocks and use hunting as a management tool.

One promising technique to discourage geese from grazing on lawns is to spray the grass with methiocarb, a chemical repellent. When the geese ingest the treated grass they become slightly ill. Hence they develop an aversion to it and abandon the site for others. The repellent, however, has not been approved by the Environmental Protection Agency, and until it is the chemical cannot be used legally as a goose repellent.

For now the best solution for frustrated homeowners is habitat modification to make problem sites less attractive. For example, some lawns could be replaced with ground cover that geese find unpalatable, such as myrtle or pachysandra. Another option is to plant hedges and shrubs to break up open areas. This often works because geese avoid areas where they can't see well and predators can sneak up on them.

There is no easy solution to the Canada goose problem and no consensus about how to manage their populations. The real dilemma is that these birds are loved by some, hated by others. Bird watchers, and to a lesser extent hunters, receive the benefits of expanding goose populations while other people have to contend with the liabilities. The thrill of seeing a flock of geese overhead is not the same as the one felt when encountering their fecal material underfoot. We can only hope that most people will continue to view these flocks as a link to a mystic wilderness and not as 20-pound starlings. □

Gregory Chasko is a waterfowl biologist with the Wildlife Bureau of the Connecticut Department of Environmental Protection in North Franklin. Michael Conover is an associate scientist in the Department of Plant Pathology and Ecology, the Connecticut Agricultural Experiment Station, New Haven.

Further Reading

Conover, M. R., and G. G. Chasko. "Nuisance Canada goose problems in the eastern United States." *Wildlife Society Bulletin*, vol. 13, pps. 228–233.

Dill, H. H., and F. B. Lee, eds. *Home Grown Honkers*. U.S. Department of Interior, Fish and Wildlife Service, Washington, D. C. 1970.

Hanson, H. C. *The Giant Canada Goose*. Southern Illinois University Press, Carbondale. 1965.

ART GINGERT

THE POET SAYS GOOD-BYE TO THE BIRDS

A provincial poet
and birder,
I come and go about the world,
unarmed,
just whistle my way along,
submit
to the sun and its certainty,
to the rain's violin voice,
to the wind's cold syllable.

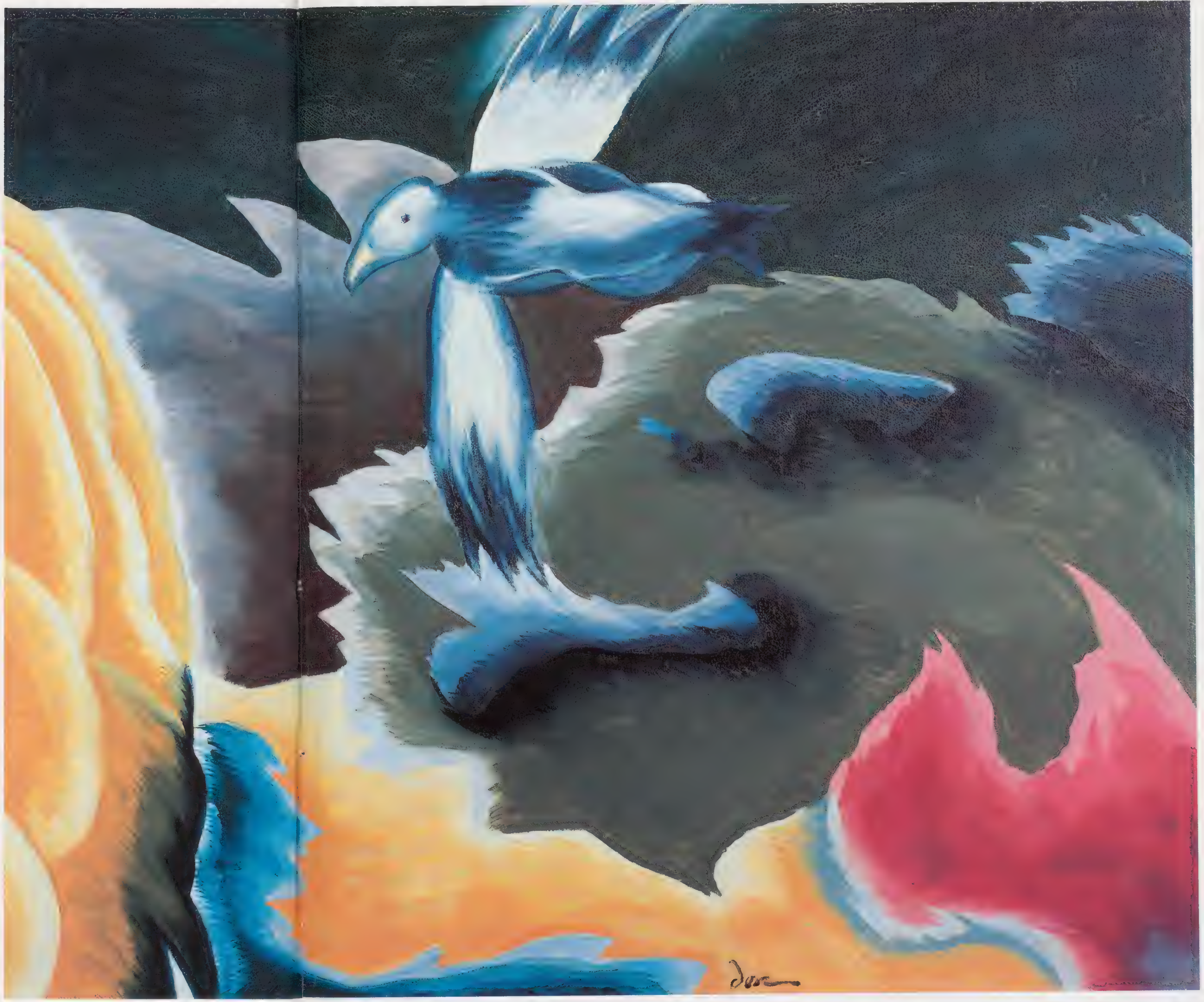
In the course
of past lives
and preterit disinterments,
I've been a creature of the elements
and keep on being a corpse in the city:
I cannot abide the niche,
prefer woodlands with startled
pigeons, mud, a branch of
chattering parakeets,
the citadel of the condor, captive
of its implacable heights,
the primordial ooze of the ravines
adorned with slipperworts.

Yes yes yes yes yes yes,
I'm an incorrigible birder,
cannot reform my ways—
though the birds
do not invite me
to the treetops,
to the ocean
or the sky,
to their conversation, their banquet,
I invite myself,
watch them
without missing a thing:
yellow-rumped siskins,
dark fishing cormorants
or metallic cowbirds,
nightingales,
vibrant hummingbirds,
quail,
eagles native
to the mountains of Chile,
meadowlarks with pure
and bloody breasts,
wrathful condors
and thrushes,
hovering hawks, hanging from the sky,
finches that taught me their trill,
nectar birds and foragers,
blue velvet and white birds,
birds crowned by foam
or simply dressed in sand,
pensive birds that question
the earth and peck at its secret
or attack the giant's bark
and lay open the wood's heart
or build with straw, clay, and rain
their fragrant love nest
or join thousands of their kind
forming body to body, wing to wing,
a river of unity and movement,
solitary
severe birds among the rocky crags,
ardent, fleeting,
lusty, erotic birds,
inaccessible in the solitude
of snow and mist,
in the hirsute hostility
of windswept wastes,
or gentle gardeners
or robbers
or blue inventors of music
or tacit witnesses of dawn.

A people's poet,
provincial and birder,
I've wandered the world in search of life:
bird by bird I've come to know the earth:
discovered where fire flames aloft:
the expenditure of energy
and my disinterestedness were rewarded,
even though no one paid me for it,
because I received those wings in my soul
and immobility never held me down.

Pablo Neruda

COURTESY OF THE WILLIAM C. JANSS COLLECTION



"Seagull" by Arthur Dove

Poem reprinted from *Art of Birds* by Pablo Neruda, translated by Jack Schmitt. Copyright © 1985 by Herederos de Pablo Neruda, by permission of the University of Texas Press

The Metropolitan Museum of Art, Purchase, The Dillon Fund Gift, 1979

Confessions of an Addict

SHELDON R. SEVERINGHAUS

It is well known that some people suffer from altitude sickness in the mountains. But I, for some mysterious reason, suffer from lowland sickness. This disease is characterized by chronic daydreaming, glassy eyes gazing through office windows, past the monotonous gray of urban concrete, searching for the dark green hills somewhere beyond. The daydreaming is accompanied by recurring hallucinations—visions of mountains and valleys descending in tiered ranks to the horizon; the sound of wind stirring pine branches; the taste of clear water from a tumbling stream; the fragrance of unadulterated air scented with flowers; and, under foot, the Earth in all its textured forms.

I am told that my disease is not a disease at all but an addiction and that it is clearly an irrational reaction to the rush for economic growth and development. "No contest," I confess. In today's world there may be no cure for this addiction, but at least one can seek temporary relief, a fix of wilderness—mountains, valleys, forests, streams, and clean air.

Perhaps this is why I found myself some time ago in the mountains of Taiwan, looking for one of the world's least known birds—Swinhoe's pheasant. This species is found only on the island of Taiwan. It was discovered in 1862 by Robert Swinhoe, the British diplomat and naturalist. Since then, other specimens have been collected. Yet little was known about its status or life history, and it had never been studied scientifically.

The need for a high-mountain fix and the challenge of the unknown led me to my study area and a small blind deep in virgin hardwood forests of Taiwan. The elevation was about 6,600 feet, close to the upper limits of the pheasant's range. It was 4 a.m. when I settled in. I would remain there throughout the day in hopes of seeing a free-living pheasant in its native habitat. I was in a state of high anticipation.

Still, it was night—black in the forest outside the blind and all around me. To humans the forest night is alien; the unknown and the unseen often stir deep-seated fears. Yet it need not be so. One can learn to "see" with the ears so that the sounds of night become as familiar as companions in the day.

As I began the two-hour wait for dawn, I shut my eyes and opened my ears. A gust of wind rattled some dead branches in the forest canopy above; one snapped and fell onto the dry leaf litter outside the blind. Then I heard some faint but regular and deliberate steps crossing the hillside upslope from the blind. The sounds were neither those of a small scurrying forest rodent nor the heavier sounds of a much larger mammal. They were something in between.

Suddenly the silence was broken by a hoarse cough. Immediately my visitor identified himself as a barking deer. His bark was as individual as a person's signature. Hearing him was as good as seeing him—a harmless and curious denizen of the night making his solitary rounds. He had doubtless caught my scent with a sense as keen as human eyes in the daytime. We had communicated in a primitive way, each alert to the other even in the inky blackness. Then a brown wood owl announced itself with deep, mournful hoots somewhere behind me, followed immediately by the piercing whistle of a giant white-bellied flying squirrel. The forest was alive at night, an active world. I could never function in it myself, but at least its inhabitants were familiar to me and I could marvel at their adaptations to nocturnal life. I felt comfortable and at ease being among them.

Gradually the darkness lifted, revealing gigantic tree trunks standing as silent sentinels of the night around my blind. How many people, I wondered, had ever sat alone in a virgin forest. The owl delivered its final notes of wisdom as day further diluted darkness. Then the owl fell silent; the deer and the giant flying squirrel had also retired—quiet, unseen, but surely somewhere close by.

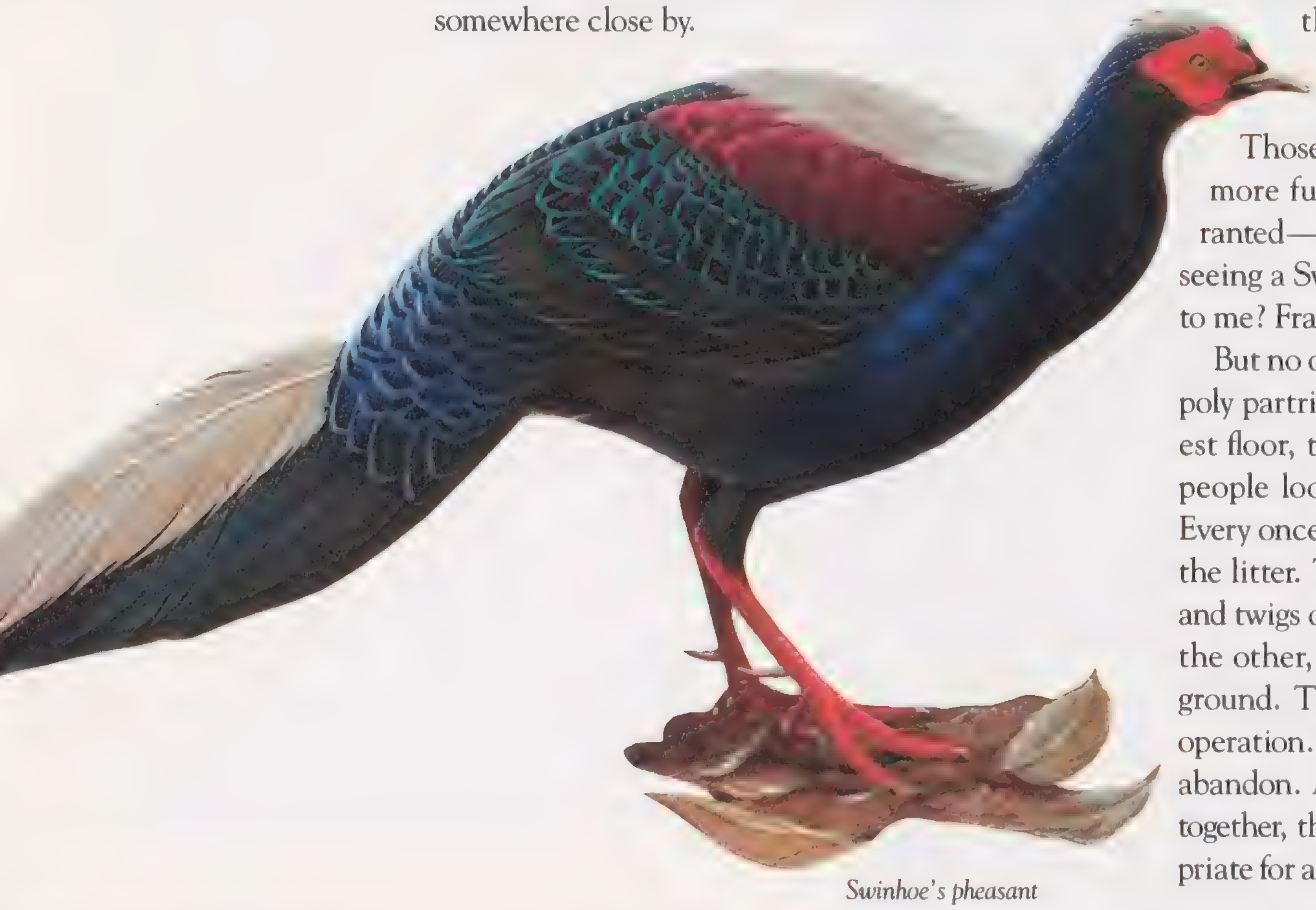
As I peered through the observation holes in the blind, the forest began to materialize. First in grays, then in shades of brown. Finally, as the sun climbed over a nearby mountain ridgeline, the forest burst forth with speckled yellows dancing on the leaf litter—sunlight filtered by the lush screen of shifting foliage.

Early descriptions of Swinhoe's pheasants suggested that they lived in jungles of impenetrable vegetation and entangling vines. The forest I was sitting in that morning did not resemble dense jungle at all. It was more like a park. The gentle mountain slopes were covered with a rich layer of leaf litter, a few ferns, and scattered logs and limbs. A sparse understory of green saplings represented the next generation of trees. But one could still walk freely among the gigantic trees, their branches arching high overhead to form a vaulted nave.

As the sun took the chill off the early morning air, several species of flycatchers and babblers began singing and darting about outside the blind, seemingly unaware of me. Each species had its own song, its own call notes, indeed, its own language. All were looking for food after the long night. While watching these birds, I caught the sound of rustling leaves off to one side of the blind. My heart quickened. Could it be the pheasant I had traveled so far to see? I held my breath as I strained to see through the peepholes in the blind. The sound was loud enough to be produced by a large bird. The sound grew nearer. It must be a pheasant, I thought. Soon this beautiful blue bird with a stunning white back and central tail feathers would come into view.

Around the end of a fallen log at that moment appeared a troupe of Formosan hill partridges one by one. I had seen this species before and so dismissed the birds in anticipation of the pheasant. Then I did a double take. I realized the partridges were making that noise. Those six chunky little creatures were creating more fuss on the forest floor than their size warranted—especially since they shattered my dream of seeing a Swinhoe's pheasant. How could they do that to me? Frankly, I felt cheated. And irritated, too!

But no one can hold a grudge against a band of roly-poly partridges. They moved comically across the forest floor, turning here and there like absentminded people looking for something they had misplaced. Every once in a while a bird stopped to clear a place in the litter. The squat little fellow began kicking leaves and twigs out behind him, first with one leg, then with the other, backing up and lowering his head to the ground. There's nothing delicate or quiet about this operation. But it is effective, as leaves go flying with abandon. And when the whole band happens to do it together, the ruckus is quite considerable—more appropriate for a pheasant than these pint-sized individuals.



Swinhoe's pheasant

R. DAVID DIGBY

Once the party had passed in front of my blind and disappeared I noticed that they had left their own signatures behind—oval areas on the forest floor cleared of leaf litter and twigs down to the rotting humus rich in nourishing insect life. Their seemingly aimless ambling was not aimless after all. I also realized that the hill partridge, like the Swinhoe's pheasant, is a species unique to the island of Taiwan. Although relatively common, it is seldom seen because of its preference for deep forests.

By now it was warming up and I was getting tired. The sun was noon-high judging by the short shadows outside the blind. I had been sitting in the cramped quarters for eight hours. Drowsiness was overcoming me and my eyelids were drooping. I must have dozed off momentarily because the loud, cheerful whistle of the white-eared sibia, a babbler endemic to Taiwan, startled me to attention. I looked out the peepholes to check the forest. Still no pheasant. But wait—there was a medium-sized brown bird moving slowly about 20 yards away. At first I thought it might be a female pheasant. But it was too rotund and short-legged. Furthermore, it rocked forward and backward in a curious fashion. The bird stopped periodically to thrust its long bill into the ground. Through my binoculars, I saw that it was a Eurasian woodcock, a species for which there were only two previous records in Taiwan. The woodcock stayed with me for almost three hours, probing the soft forest soil for its favorite delicacies and sleeping with its head and bill tucked underneath one wing. Its irregular brown and black plumage blended beautifully with the background of leaves and twigs. When not moving, it was almost impossible to see.

The late afternoon sun was beginning to cast long shadows in the forest and the light was taking on that burnt golden hue of a fading day. In a few hours I would start my trek back to camp where I would enjoy a hearty meal. With thoughts of food uppermost in my mind, I glanced mechanically out the peephole to scan for pheasants. I was instantly overcome with a seizure—my heart leaped, I gasped to catch my breath, all muscles froze. A stunning male Swinhoe's pheasant stood erect and alert not 10 yards from my blind. He was motionless, standing on one long red leg, the other slightly lifted, his short white crest raised warily. He looked directly at me.

I dared not move. I was afraid to breathe, fearing that the slightest noise would frighten the sensitive creature. I remained fixed in the same position until my muscles ached. Then the bird began to move, apparently satisfied that there was no immediate threat. I relaxed, too. Unlike the comical partridges, the pheasant walked with the dignity and stateliness of a king. He stopped to feed in some of the openings made by the partridges earlier in the day, his bill pecking selectively at items I could not see. He also cleared a few small areas himself in search of food. Whereas the partridges were crude and clumsy, the pheasant gracefully and deftly flicked leaves away with his toes before bending to feed.

Then it dawned on me. The bird was virtually silent, making almost no noise as it crossed the forest floor—a remarkable accomplishment given the dryness of the leaves and twigs on a warm spring afternoon. No wonder he had just simply appeared in front of me with no advance indication. The flickering spots of sun caught the iridescent blues, greens, purples, and maroons on the bird's shoulders and back. They glinted and flashed like the dancing refractions of light through multicolored glass, a kaleidoscope of dazzling colors and patterns.

The bird was virtually silent, making almost no noise as it crossed the forest floor—a remarkable accomplishment given the dryness of the leaves and twigs on a warm spring afternoon.

The bird moved slowly across the sloping forest floor until it disappeared over a small rise in the distance. For some time, I hardly moved and was not really aware of my surroundings. I was in some kind of trance, carried to another level of concentration by my encounter with this beautiful creature.

I had finally lived something I had only dreamed about—I had become part of the world of the Swinhoe's pheasant and had seen one living free within its own community.

A chill shivered through me at that moment. Perhaps it was the tension and excitement released suddenly after the bird had disappeared. Perhaps it was the edge of fast-approaching dusk. I hadn't realized it, but the sun had long since set. The air was getting cool, there was an eerie silence through the forest, and the great trees were resuming their ghostlike stance.

When the first flying squirrel whistled sharply, I figured it was time to return to camp. I got out of the blind, stood up unsteadily, and stretched for the first time in 15 hours. Then I began the four-mile hike. The day had again given way to the sounds of night. The creatures of a different world came to life. I knew them all, even though I could not see them. I felt a sense of exhilaration as I walked back in the starlit night.

I have been back in the lowlands for some time now. It is hard to concentrate. My eyes wander through the office windows, searching beyond the gray drab of urban concrete for the dark green of hills somewhere beyond. In my mind I hear an owl calling, the wind snapping a dead twig. A family of partridges shuffles by. Then, suddenly, I see a magnificent blue pheasant standing erect and alert looking me straight in the eyes, its white crest raised warily. I shiver. I am an addict. I need another fix. □

Sheldon Severinghaus spent 15 years studying wildlife resources in Taiwan, and is currently special assistant to the president of The Asia Foundation in San Francisco.

LOOKING FOR THE PERFECT FIELD GUIDE

KEVIN J. ZIMMER

PAUL SOLOMON (WHEELER PICTURES)

Bird watchers search forests, fields, and marshes for the quintessential field guide.

Birders in the United States and Canada are blessed with an abundance of field guides. Because of the recent blossoming interest in bird watching, the number of these guides on the market has expanded rapidly, and many birders wonder which of the current works to buy. The perfect field guide, of course, does not exist. Any field guide, by its nature, is a compromise between completeness of information and the need to keep the product affordable and small enough to use in the field. My preferences are somewhat subjective, but I do think I can suggest what constitutes a good field guide and can make some recommendations regarding each book.

There are four criteria upon which a field guide should be judged: text, illustrations, range maps or descriptions, and usability.

Text must be accurate and complete. It should cover sexual, age, and geographic variation in plumage and should tell us how best to distinguish confusingly similar species. Is the identification of groups that differ only subtly (gulls, shorebirds, flycatchers) treated adequately? Are vocalizations and behaviors described?

Field guides may be illustrated with paintings, photographs, or both. I have a strong bias toward paintings. Photograph fans claim that paintings give the artist's subjective rendition instead of the camera's objective view. In fact, a painting is a composite drawn from skins, photographs, and the artist's personal experience with the bird. A photograph freezes one individual at a single moment and is subject to vagaries of light, film, and other conditions. Even such subtleties as posture may be atypical in photographs since the bird may be alarmed by the photographer. Paintings can reveal all field marks in a single drawing, almost impossible in one photograph.

Whether the guide uses paintings or photos, they should be accurate. Do the paintings correctly portray the birds' field marks? Do they really look like the birds? Are photos incorrectly identified (a surprisingly frequent problem), are they in focus, and do they portray true colors?

Comprehensiveness is another consideration. Do the illustrations cover sexual, age, and geographic variation within a species? Are we shown both flying and stationary views of birds where these are useful for identification, as in tubenoses, waterfowl, gulls, terns, shorebirds? Ideally, paintings or photos should serve as identification tools even without text.

Knowing the geographic range of a particular species is also important in its identification. For example, an *Empidonax* flycatcher with yellow underparts in Maine is likely a yellow-bellied flycatcher and not the extremely similar western flycatcher, a species found only west of the Great Plains. For that reason range descriptions or maps, which explain or show where each species is found, have become standard in all field guides. Verbal descriptions are sometimes more precise but maps convey information at a glance.

Not all maps are created equal, however. Some are too small and imprecise. Others use stippling or color schemes that are difficult to distinguish. Maps that do not include state lines are difficult to decipher as are those that depict breeding and winter ranges only, leaving the reader to guess where the species occurs during migration.

Many factors determine the usability of a field guide. Is the information in one volume or more? Can the information be readily extracted? Are species in taxonomic order? Is the book small enough to carry? Are illustrations, maps, and text placed on facing pages, or does the reader have to flip from one part of the book to another? Are similar species grouped together for ease of comparison?

Following is a list of the guides I will examine.

- *A Field Guide to the Birds of Eastern and Central North America* (Peterson, 1980), hereafter "Peterson East"
- *A Field Guide to Western Birds* (Peterson, 1961), "Peterson West"
- *A Guide to Field Identification: Birds of North America* (Robbins et al., 1983), "The Golden Guide"
- *National Geographic Society Field Guide to the Birds of North America*, 2nd ed. (1987), "The National Geographic Guide"
- *An Audubon Handbook: Western Birds* and *An Audubon Handbook: Eastern Birds* (both by Farrand, 1988), "Audubon Handbooks East and West"
- *The Audubon Society Master Guide to Birding,* vols. 1–3 (Farrand, 1983), "The Master Guide"
- *The Audubon Society Field Guide to North American Birds: Eastern Region* (Bull and Farrand, 1977, revised 1985), and *The Audubon Society Field Guide to North American Birds: Western Region* (Udvardy, 1977, re-

Guide	Text		Illustrations				Maps		Usability	Overall Rating
	Accuracy	Completeness	Accuracy	Completeness	Effectiveness	Quality	Accuracy	Clarity		
National Geographic Guide	❺	❺	❹	❺	❺	❹	❹	❸	❺	❺
Master Guide	❹	❹	❹	❸	❹	❹	❹	❸	❸	❹
Peterson East	❹	❸	❹	❸	❹	❹	❺	❺	❹	❹
Peterson West	❹	❸	❹	❸	❹	❹	—	—	❸	❹
Golden Guide	❸	❷	❷	❸	❹	❸	❸	❹	❺	❸
Audubon Handbook East	❸	❶	❷	❶	❷	❹	—	—	❷	❷
Audubon Handbook West	❸	❶	❷	❶	❷	❹	—	—	❷	❷
Audubon Guide East	❷	❶	❷	❶	❶	❷	❷	❸	❶	❶
Audubon Guide West	❷	❶	❷	❶	❶	❷	❷	❸	❶	❶

❺ = Excellent ❹ = Good ❸ = Adequate ❷ = Unsatisfactory ❶ = Poor

vised 1986), "The Audubon Guides East and West"

The National Geographic Guide. The cream of the crop. The text is excellent and manages to compress a remarkable amount of information into a convenient format. It is superior to all others in describing and illustrating sexual, age, and geographic variation within each species, and gives full attention to all of the age variations in gulls and juvenile shorebirds.

The quality of the art is generally good but inconsistent because many artists were used. The range maps are the weakest link, frequently being difficult to decipher. As a rule only breeding and wintering ranges are depicted, leaving the reader to guess migration routes, but these inconveniences are minor given the overall quality of the book.

The Master Guide. The text is generally good and some species accounts, western *Empidonax* flycatchers for instance, are outstanding in their attention to subtle differences in shape, behavior, vocalizations, and plumage characteristics. The photographs are well-chosen and illustrate age and sexual variation. For such groups as gulls and shorebirds, photos may even be superior to drawings in capturing subtleties of shape and plumage.

On the down side, the bulky three-volume series is difficult to use in the field. It also suffers from the problems inherent in photographs and is less than complete in illustrating the full range of sexual, age, and geographic variation in plumage for each species. Also, the quality of the species accounts varies widely because they were written by many authors.

Peterson East. This offering from Roger Tory Peterson contains the most consistently superior art of any guide. The text is concise and accurate, and the range maps, by Virginia Peterson, are the best available.

The guide is somewhat inconvenient because only eastern North America is covered—birders in the Great Plains will need to carry a companion guide. Also, the maps are in the back, not opposite the plates, making them somewhat less usable.

Peterson has included few recent advances in identification (mostly for such difficult groups as gulls, shorebirds, and flycatchers). Although this material may be pertinent mainly to expert birders, there is no excuse for omissions such as illustrations or mention of juvenal-plumaged shorebirds. The juvenal plumage of many species is often radically different from that of the adult, and is worn by many southward-moving shorebirds in late summer through fall when birders are most likely to see them.

Peterson West. It is somewhat unfair to compare this guide with the others since it was last revised in 1961. Nonetheless it stands up quite well, and we look forward to the revision which is under way. As with Peterson East, the quality of the art is superior and the text is concise and reasonably accurate.

This book suffers from an inconvenient format (text does not face the plates) and from a lack of range maps. Many birds are illustrated only in black and white, and the taxonomy and nomenclature are dated. Many advances in our knowledge of identification came after this book (which laid much of the foundation for them) and therefore are not included. No attention is paid to juvenile shorebirds and immature gulls are largely overlooked.

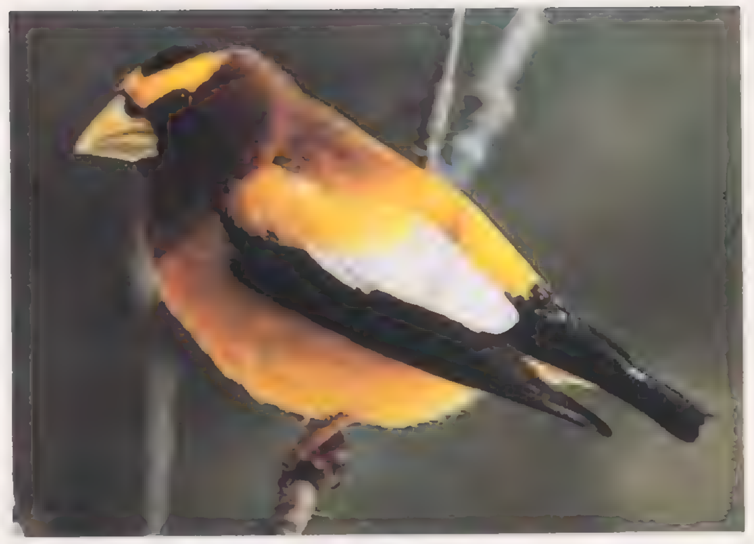
The Golden Guide. This is one of those books where the revised edition is inferior to the original. Its strengths are few and weaknesses many. On the plus side, the guide has a convenient format, with maps and text facing the illustrations. It also manages to cover the entire country in one volume.

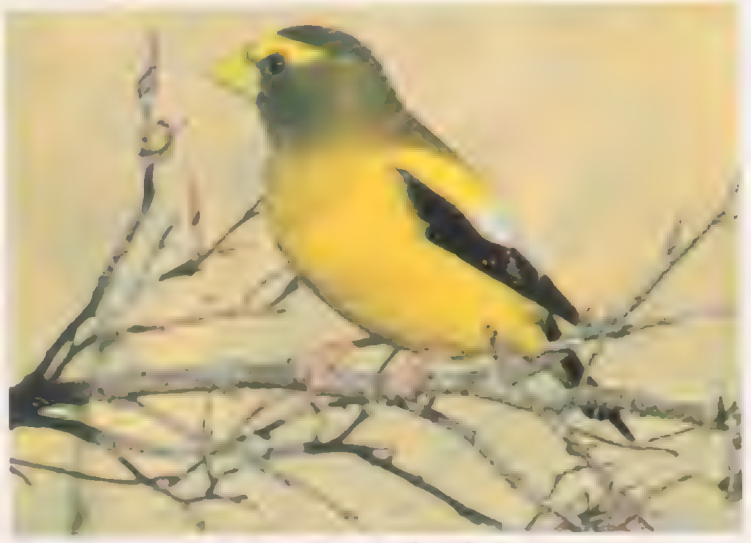
Now for the bad news. The information content is on the skimpy side, with little devoted to challenging flycatchers, gulls, and shorebirds. Geographic variation is also given short shrift. Unfortunately, much of what is presented is inaccurate. For example, the text claims that female cinnamon teal is "told from female blue-winged by more shoveler-like bill and more distinct facial markings." The bill difference mentioned is correct, but the female blue-winged is the one with the distinct markings. Female cinnamons have virtually unpatterned faces.

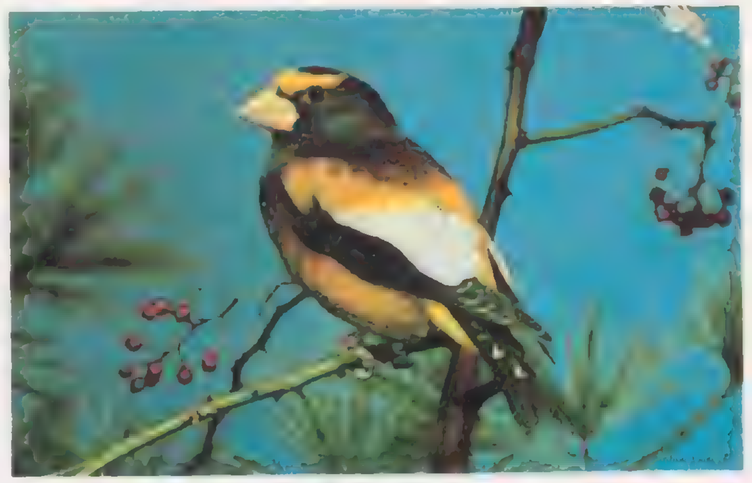
There also are numerous errors and inconsistencies in the art. The rendition of the Sprague's pipit, for example, does not even remotely resemble the bird, and the illustrations of wrentit, clay-colored sparrow, and many of the gulls and small shorebirds are only marginally better. Worse is the color reproduction. One has only to look at the mustard-yellow throat and belly on the western flycatcher to lose all confidence in the colors. No juvenal-plumaged shorebirds are illustrated. Instead, we are shown winter plumages of sandpipers which are almost never seen in the United States in that plumage, like Baird's, white-rumped, and semipalmated (not to mention spoonbill and other Eurasian stints). Even the maps have errors and they do not show state lines, making the range of a bird difficult to determine.

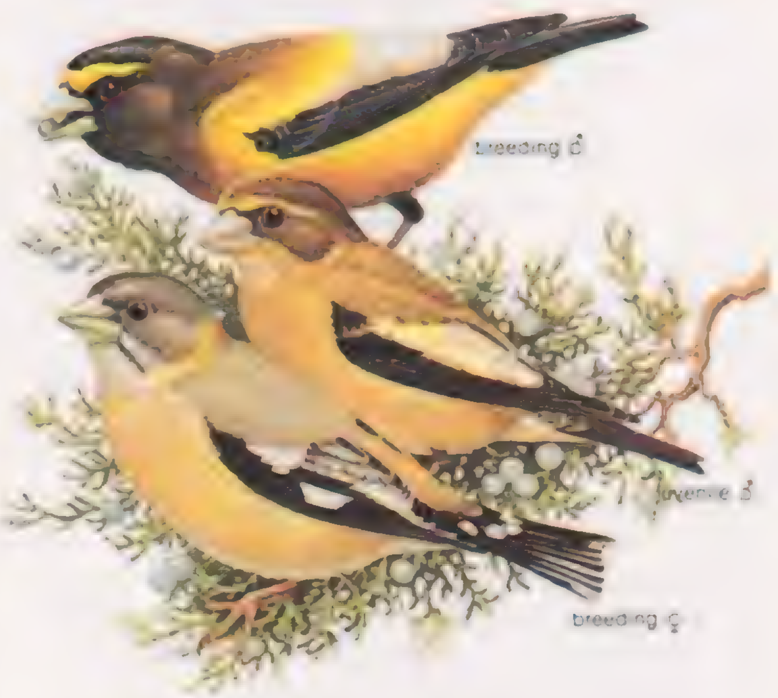
The Audubon Guides East and West. These books discard taxonomic sequence in favor of a color and habitat arrangement, creating a ludicrous system in which the reader has a difficult time finding anything. Male painted bunting, for instance, is under the "green bird" section. Pity the birder who encounters this largely red bird and tries to find it using these books. The text for pectoral sandpiper is located under "lakes, ponds, rivers," some of the least likely places to find one. And how can anyone justify putting dusky flycatcher on page 601 and the very similar Hammond's flycatcher on page 740?

Many photos are poorly selected. We are given nest shots of shearwaters (great if you live in New Zealand), standing *Sterna* terns (flying ones would help), no ju-


James Hawkings. By permission Chanticleer Press, Inc.


Stephen Krasemann. By permission Chanticleer Press, Inc.


Ron Austing. By permission McGraw-Hill Book Company



Diane Pierce. By permission of the artist and the National Geographic Society © 1987

Four renditions of the evening grosbeak illustrate the range of variability among the various field guides. The top three are photos from the *Master Guide*, *Audubon Guide West*, and *Audubon Handbook*, respectively. Photos are nice to look at but are subject to vagaries of light, film, and other conditions. At bottom is a painting from the *National Geographic Guide*. Paintings tend to look more like "typical" members of a species, as they are composites drawn from skins, photographs, and the artist's experience.

venile shorebirds (very different from adults), very few immature gulls (also different from adults), and mostly perched hawks (few flight shots). I defy any neophyte to identify the *Empidonax* flycatchers, northern shrike, or sage thrasher using only these photos.

The text is equally poor, with numerous omissions and inaccuracies. The maps too are frequent sources of error. Swainson's hawk and semipalmated sandpiper are shown as regularly wintering in the United States (they do not), while many birds are shown as absent from areas where they are common. Particularly amusing is the range map that indicates turkey vultures do not occur in south or west Texas!

The Audubon Handbooks East and West. These two volumes constitute a slick marketing package that is bound to sell lots of books. An attractive layout combined with liberal use of sharp photographs and promises of "a new approach to birding" are guarantees of a big seller. In this case, however, beauty is definitely skin-deep.

The author has chosen to step outside taxonomic sequence, stating that "no knowledge of taxonomy is required to find a species." Instead, warblers precede flycatchers, buntings precede hummingbirds, and gulls precede everything. In addition, both photos and text are incomplete. Some species, such as Clark's grebe, Xantus' murrelet, Sprague's pipit, and Smith's longspur, are not pictured at all. For many others we are shown only one plumage even though the species involved may look entirely different at different times of year. Examples include rhinoceros auklet, elegant tern, black tern, and all of the longspurs (breeding only), and marbled murrelet and rock sandpiper (winter only). For many of these birds the neglected plumage is the only one likely to give birders problems.

Inaccuracies abound. Thus we are shown a purported "adult glaucous-winged gull" that is anything but, and an "immature mew gull" that appears to be a first-year ring-billed. The text is frequently off base. The statement that herring gull is "goose-sized" while Thayer's gull is "crow-sized" is ridiculous. It implies a large size difference between two birds that are very similar.

The book contains no range maps which perhaps is just as well. The range descriptions alone provide enough problems. The statement that gray flycatcher "winters mostly in New Mexico" is interesting considering that there are no documented winter records for the state. Likewise, south polar skua is listed as "occasional off s. California" with no mention of occurrences elsewhere on the West Coast. In fact, the bird is a regular migrant offshore from Canada to San Diego.

All in all, both of the Audubon guides and the Audubon handbooks are fun to look at but hopeless as field guides. □

Kevin Zimmer is an international tour leader and author of two birding books.

YOU TOO CAN BE AN EXPERT

What's all this talk about taxonomic order and variations in plumage? Chances are you're already familiar with these concepts, but if you're not, here's the scoop.

TAXONOMIC ORDER

Field guides traditionally have been organized with the birds in taxonomic order, that is, the order in which ornithologists believe the birds evolved. Hence loons—the oldest living birds—are found on the first page, and finches, the most recently evolved species, are found at the end of the book. Bird-song recordings and regional bird checklists have also followed this arrangement, and throughout the decades thousands of birders have learned taxonomic order by using these aids.

SEXUAL VARIATIONS IN PLUMAGE

In many species, males and females do not look at all alike. The male rose-breasted grosbeak, for example, has a black back, white belly, and rose-colored chest, whereas the female looks like a big, brown and white sparrow. A comprehensive field guide must show both plumages for all such species.

AGE AND SEASONAL VARIATIONS IN PLUMAGE

Many birds undergo changes in plumage as they mature. The best examples are among the gulls, several of which are mottled white or brown during their first winter and don't gain their adult plumage until they are two or three. Other species change plumages with the seasons. Many warblers, for example, are colorful in the spring and summer but molt into drab nonbreeding plumage each fall. A comprehensive field guide must show each year's and season's plumages for all such species.

GEOGRAPHIC VARIATIONS IN PLUMAGE

Some species look different depending on where they live. Eastern meadowlarks in the Southeast are bright yellow and brown, those in the Southwest are pale yellow and gray. Comprehensive field guides must show all regional variations in plumage for each species.

JUVENAL PLUMAGE

Juvenal plumage is the term for the feathers worn by a bird during its first few weeks. This plumage almost always differs in appearance from the adult plumage.

BREEDING RANGE VERSUS WINTER RANGE

Some birds are nonmigratory and stay in the same area all year. Migratory birds, however, breed in the north and spend winters to the south, sometimes as far as South America. Any good field guide must describe, or show visually on a range map, the regions in which each species is found at every time of year.

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The Sapsuckers, 1985

ALL PHOTOS BY PAUL SOLOMON (WHEELER PICTURES)

FOR LOVE OR MONEY

RICHARD E. BONNEY, JR.

When I was young I measured time in terms of Christmas. I remember, in the early days of spring, telling friends that Christmas was only eight months away. By December I would lose sleep anticipating the big day. Even after I grew up I'd plan yearlong for Christmas, with its eggnog and days off and holiday cheer.

But all that has changed. My annual reference point has moved nearly 180 degrees around the calendar. Now I measure time in terms of the Biggest Day—that day each May when I lead the Sapsuckers, a team of birders carrying the banner of the Cornell Laboratory of Ornithology, on a prodigious birding quest in New Jersey.

The idea is simple. For 24 hours we bird the Garden State as intensively as possible. We start at midnight in the north, near the Great Swamp National Wildlife Refuge, listening for owls and marsh birds. Dawn finds us searching out warblers in a New Jersey Audubon Sanctuary. By midday we're at Brigantine Refuge, watching shorebirds and seabirds, and a few hours later, when darkness falls on Cape May, we're somewhere on that bird-packed peninsula trying to stay awake and add one or two final species to our tally. At midnight Saturday we quit with a list approaching 200 species of birds seen or heard and positively identified.

The Biggest Day is an arduous affair. When it ends we're exhausted, our stomachs hurt, and our heads ache with the sights and sounds of several thousand birds. Yet we're not the only team afield. More than 20 squads of intrepid birders participate in the event, conducted by the New Jersey Audubon Society and also known as the "World Series of Birding." Yes, the Biggest Day is a bird-watching competition. There are even awards. For the team that finds the most species there's the Urner-Stone Cup, named after two prominent New Jersey ornithologists. And for the out-of-state team that finds the most species, there's the Ed Stearns Award—named after a man who held the New Jersey big day record for 30 years—consisting of

EDWIN I.
STEARNS
AWARD

BHL

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a pair of Bushnell binoculars imbedded in a chunk of granite.

If the whole event sounds crazy, let me assure you it is. Perhaps that's because it was invented by a crazy guy, a super birder named Pete Dunne.

Here's how the world series was born. In the early 1980s Pete and three friends started birding one or two big days during the height of the spring migration each May. During that time about 250 species are present in New Jersey, and following a carefully chosen route, the Guerilla Team would try to locate 200 of them in 24 hours—quite a feat, since the birds are spread over several different habitats, and many are rare or very secretive. Yet a couple of times the guerillas came close to their goal. In 1982 they did a big day on May 16 and found 185 species; on May 14, 1983, they nailed down 194.

But then the team started getting bored. Just a little, mind you, but enough to inspire—or was it the beer?—a strange discussion one winter's night in the C-View Inn. "What we need," someone said, "is a little competition. We're getting complacent. How 'bout challenging some other teams to beat our score?"

Clockwise from top right: Dick Turner of the Green Mountain Muthas updates Big Day checklist; Pete Dunne, perpetrator of the Biggest Day, proves that even real birders need tripods; Dunne's Guerilla Team scans the mud flats at Brigantine Wildlife Refuge.

Big days had been run for years. Apparently historians were sleeping when the first one was made, but we do know that Charles Urner and his cronies were doing big days in New Jersey back in the 1920s. And by the 1970s the American Birding Association was publishing big day results from across the country in its journal, *Birding*. But before 1984, a competitive big day—an event at which teams competed against each other rather than against their own past tallies—had never been attempted. The time was ripe. And so, as the beer flowed and the pizza-steak hoagies gurgled, a plan was born.

Pete, then director of the New Jersey Audubon Society's Cape May Bird Observatory, got approval from the society to run the event under its banner. The American Birding Association, official codifier of birding's rules and ethics, offered its endorsement. A select committee met and laid down a few simple Biggest Day rules. And on May 19, 1984, 13 teams of crack birders fanned out across the state for the first world series of birding in history.

The idea was to have fun birding, of course. But there was more to it than that. From the start, the event was designed to raise money for bird research and conservation. Teams were encouraged to look for sponsors: people to make a pledge of a nickel, dime, or more for each species seen. The money would be collected by the team and given to its parent organization or donated to an appropriate conservation group.

The Biggest Day was also intended to raise the level of bird-watching awareness in the general public—the idea being, the event was so unusual that any self-respecting newspaper, magazine, even radio or TV station would want to cover it.

Now four Biggest Days have come and gone and each has been a bigger success than the one before. The amount of money raised by all teams combined has risen from about $20,000 in 1984 to more than $75,000 in 1987. The amount raised by the Lab alone, which didn't solicit pledges during the first year, has gone from $8,000 in 1985 to $24,000 in 1987. The event has been covered by local and national radio, TV, and print media—including *The Wall Street Journal* and *The New York Times*—and the Cornell Sapsuckers have been featured in full color in *New York* and *Ford Times* and appeared in voice and action on Channel 7, Syracuse, New York.

All this attention to birding is very important for the future of birds and the environment in general. First, the idea that birders are little old men in penny loafers has fallen by the wayside. But more important, the event is making more and more people interested in birding as a hobby or even sport. And the more people who watch and care about birds, the more likely bird populations will be preserved in the future. And, the best way to preserve bird populations is to preserve the environment as a whole. Thus increased interest in birds resulting from events like the Biggest Day can result in environmental advocacy. One example: Last year the governor of New Jersey proclaimed the Garden State Parkway to be the Garden State Migratory Bird Corridor, meaning that future development in the area will have to consider the needs of migratory birds.

I believe that the Biggest Day phenomenon is beneficial to birding and the environment in general. But not everybody feels that way. The big question: Should birding really be made into a competitive sport? Doesn't competition demean the value of this virtuous pastime?

I asked this question myself, as far back as 1984 when I first considered leading a Cornell team into the

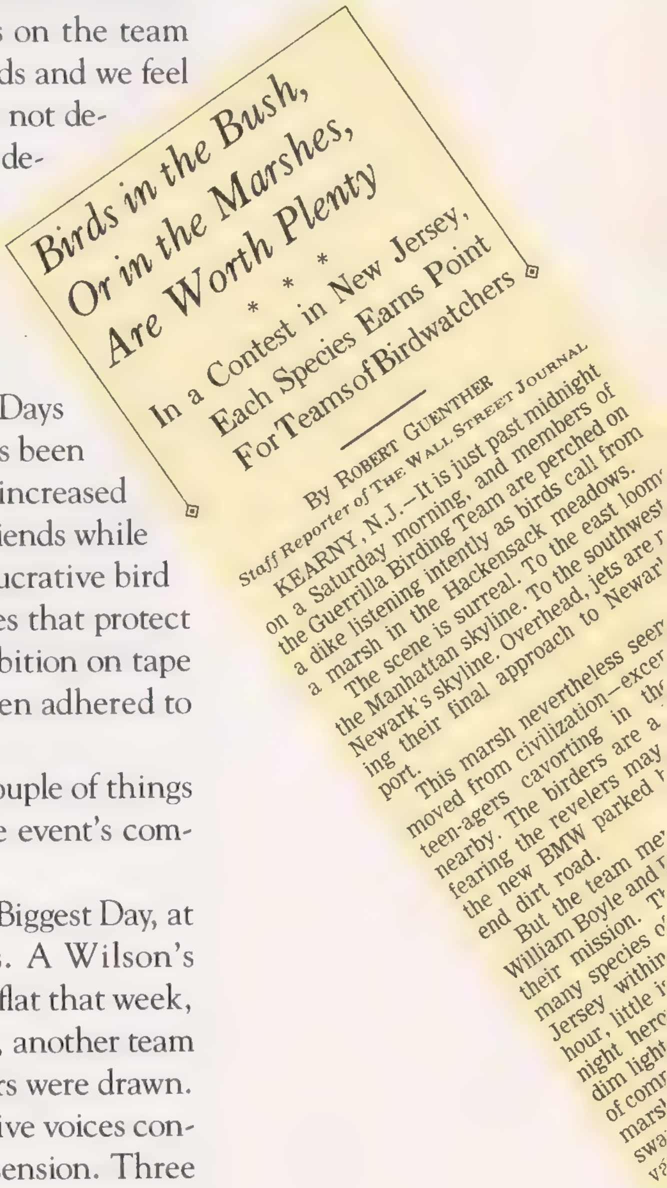
fray. I'm not normally a competitive birder. I don't even keep a life list. I don't care how big anyone else's life list is, and I refuse to drive across town to see a varied thrush blown in from California. I'll wait until my next visit to the West Coast to see one in its native habitat.

But on that first Biggest Day, after birding all night and finding 75 species before breakfast, list fever overtook me. I found myself feeling competitive. I wanted our team to win, although I knew we couldn't because we were unfamiliar with the state's birding hotspots. We ended the day with 168 species. That placed us ninth out of the 13 total teams and second to the Manomet Bird Observatory in the out-of-state competition. Nevertheless, considering how often we were lost, we felt that we had done very well. And, we'd had a great time! I remember coming home flushed with excitement.

So in 1985, when we decided to participate again and to solicit pledges from our members, I was excited and hopeful that we'd get an enthusiastic response to our appeal for support. We did. Hundreds of our members made pledges, along with comments like "Go get 'em, Sapsuckers!" "We're counting on you" and "I'm sure you'll make number 1!" I started dreaming about the event and getting a little nervous, just like I used to on the starting line of a high-school cross-country meet.

Then I received a letter from a disgruntled Lab member. "Dear Friends," she wrote. "It might be fun to go out in the field for a big day of birding, but organized competitive bird watching is offensive. I just finished reading a book, *Birding from a Tractor Seat*, by a man who had watched birds as he farmed all his life, in the same place. To watch birds, encounter their spirit, experience their lives, you have to take time. I think the team thing is dumb."

The letter gave me pause, and I contemplated it for a few days. Then I wrote back: "It's true that to know birds you have to take time. All of us on the team spend a great deal of time watching birds and we feel just as you do. But the Biggest Day was not designed to encounter birds' spirits. It was designed as a simple game that would bring publicity to bird watching and raise a lot of money for various conservation organizations. And, as far as I can tell, it is harmless."



Birds in the Bush,
Or in the Marshes,
Are Worth Plenty

* * *

In a Contest in New Jersey,
Each Species Earns Point
For Teams of Birdwatchers

By ROBERT GUENTHER
Staff Reporter of THE WALL STREET JOURNAL

KEARNY, N.J.—It is just past midnight
on a Saturday morning, and members of
the Guerrilla Birding Team are perched on
a dike listening intently as birds call from
a marsh in the Hackensack meadows.
The scene is surreal. To the east loom
the Manhattan skyline. To the southwest
Newark's skyline. Overhead, jets are
ing their final approach to Newar
port.
This marsh nevertheless seem
moved from civilization—exce
teen-agers cavorting in th
nearby. The birders are a
fearing the revelers may
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Now, three years and three Biggest Days later, I still feel that way. Each event has been lots of fun. The number of teams has increased each year and we've made lots of new friends while trading notes—including locations of lucrative bird spots—at the awards brunch. And rules that protect birds from molestation, such as a prohibition on tape recorders for attracting birds, have been adhered to strictly.

But I have to admit that last year a couple of things happened that made me reconsider the event's competitive nature.

The first took place 17 hours into the Biggest Day, at about 5 p.m. at Cape May Meadows. A Wilson's phalarope was hanging out on the mud flat that week, and as the Sapsuckers were watching it, another team came dashing up. Five sets of binoculars were drawn. Five pairs of eyes focused on the bird. Five voices confirmed the sighting. But then came dissension. Three pairs of legs dashed off, while the other two pairs stayed rooted to the spot.

"Come on!" the team leader yelled. "We're behind schedule!"

"Drop dead!" retorted the wayward team members. "We've never seen a Wilson's before and we want to

Some day the Sapsuckers hope to win the World Series of Birding. But the main reason they keep competing is for the fun, the camaraderie, and the chance to watch the sun go down over Cape May during the height of the spring bird migration.

watch it awhile!" The rest of the exchange is unprintable.

The second thought-provoking event took place on the Monday after the Biggest Day. Still a bit bleary, I was catching up on some mail when another Lab staffer dropped in.

"Heard you came in 17th."

"Yup."

"That's even worse than last year. Do you really think it's a good idea to participate in the Biggest Day if you're going to make such a poor showing?"

Well, I hadn't really thought about it that way. Sure, I had wanted to win. But my main reason for going—besides raising money for the Lab—was to have a good time. And, shutting my eyes, here's what I remembered:

Moonglow in the Great Swamp with the calls of soras, Virginia rails, woodcocks, and barred owls filling the air.

A rousing dawn chorus below a warm, misty sunrise.

Gobs of pineapple cream cheese coffeecake for breakfast.

A ruddy duck bobbing in Lake Assunpink while a bobwhite whistled from the fields beyond.

Coke, coffee, and candy bars for lunch.

More than 40 species of water birds on the Brigantine mudflats.

Indigestion for dinner.

A peaceful walk on the beach at dusk when we realized we couldn't win and decided to take a few moments watching the sunset.

A whip-poor-will calling in the dark at Belleplain State Forest.

And $24,000 in pledges from Lab members.

So my answer was simple: "Of course it's a good idea. We had a great time. The Lab is making new friends from all around the country. And we're raising badly needed funds. Who really cares if we win?"

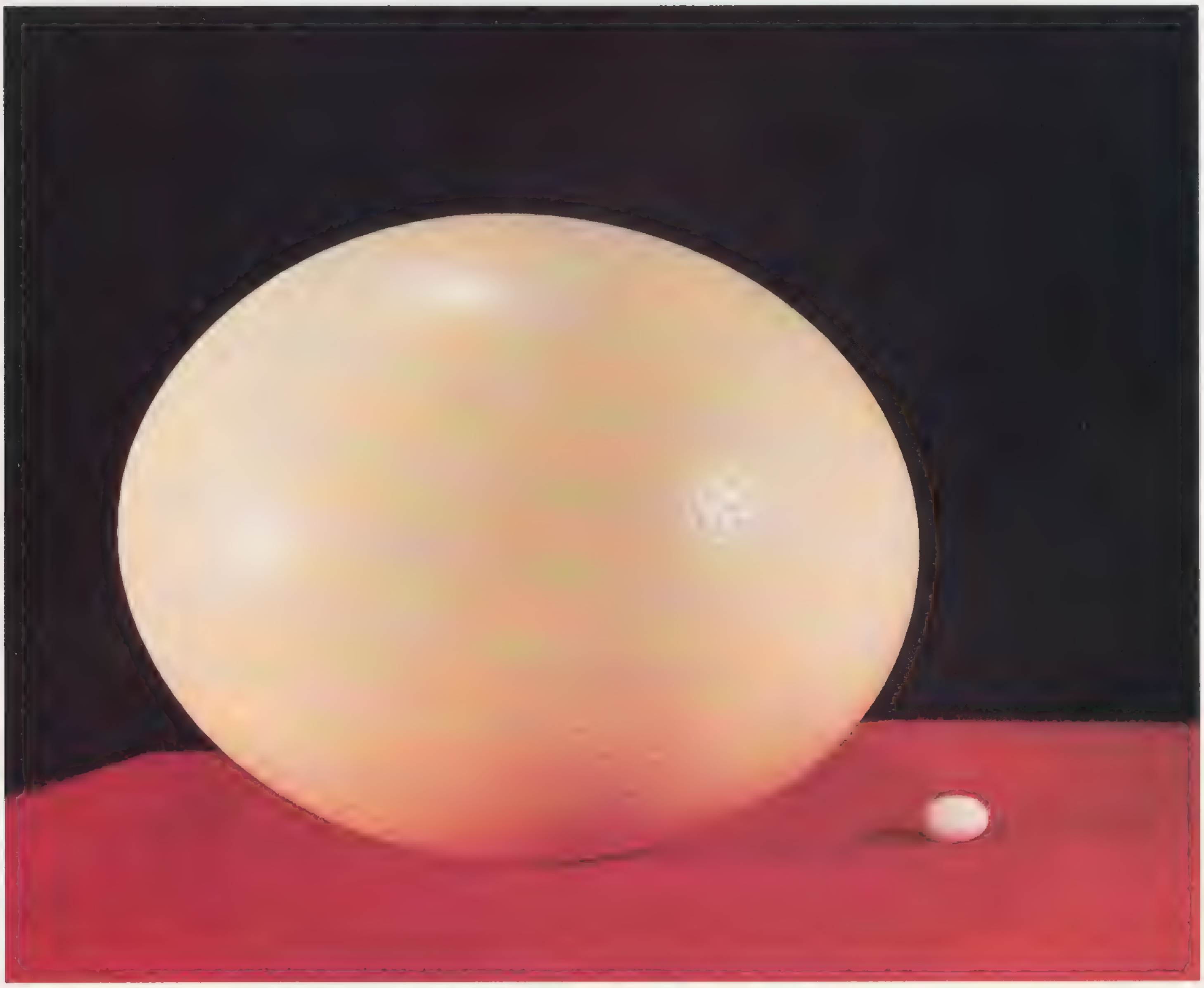
Well, I guess I do a little. But good as the Sapsuckers are, I know the odds are against us in the foreseeable future. Our excuse: the teams that win scout for days beforehand. They do dry runs, one and even two weekends before the event. And they stake out nests of hard-to-find species, ensuring that they'll add those species to their lists.

We don't scout for more than a day or two. We can't justify spending more time away from our desks. And we can't justify hiring hit men to do our scouting; that would be a waste of our members' generous pledges.

But we'll keep competing for the fun—for the chance to get out of the office and actually look at the birds we spend so much time thinking and writing about. For the feeling of camaraderie at a good birding spot, as we all shut our eyes and concentrate and identify songs and calls that most people can't even hear. For the opportunity to learn more about birds from each other. And for the great food.

So May 14th will find the Sapsuckers once again prowling the fields, marshes, and coasts of New Jersey in quest of birds. Lots of birds. We hope very much to set a new team record. And if we win the Stearns Award along the way, we won't complain.

Wish us luck! □



RUNK/SCHOENBERGER (GRANT HEILMAN)

Bird trivia fans: how many hummingbird eggs fit inside one ostrich egg?
Need some clues?
The egg on the left is an ostrich egg.
The one on the right is a hummingbird egg.
The egg of the ostrich, largest of any living bird, is about 6 inches long by 5 inches wide.
The egg of the hummingbird, smallest of birds, is about one-half inch long by one-quarter inch wide.
The ostrich egg weighs about 3.5 pounds.
The hummingbird egg weighs about .01 ounces.
The ostrich egg has large pores that allow oxygen, carbon dioxide, and water to pass to and from the developing embryo.
The hummingbird egg has little pores for the same purpose.
An ostrich lays up to 12 eggs per clutch.
A hummer usually lays 2 eggs per clutch.
Both eggs are white.
Got the answer?
About 5,500. □

An Ohio Lost Every Year

FRANS LANTING (2)

The worst thing that can happen—will happen—in the 1980s is not energy depletion, economic collapse, limited nuclear war or conquest by a totalitarian government. As terrible as these catastrophes would be for us, they can be repaired in a few generations. The one process ongoing in the 1980s that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our descendants are least likely to forgive us.—Dr. Edward O. Wilson, professor of biology, Harvard University

We will do the rational thing—but only after exploring all other alternatives.—John Maynard Keynes, economist and one of the founders of the World Bank

Tropical rainforests, which form a green girdle around the Earth's equatorial midsection, are a steamy aviary filled with an astonishing variety of birdlife. One square mile of Central or South American forest may contain several hundred species of birds. Tiny Costa Rica has more bird species than all of North America.

Some of evolution's most fantastic moments are represented in jungle birdlife: curassow, harpy eagle, Tahiti flycatcher, macaws, parrots and parakeets, resplendent quetzal, long-tailed ground roller, helmeted hornbill, Mauritius olivaceous bulbul. Unfortunately, all of these species and thousands of others are endangered because rainforest habitat is rapidly disappearing. Madagascar, with hundreds of endemic species, has only 20 percent of its forest remaining. Brazil is losing an estimated 3,656,000 acres of tropical forest a year; Costa Rica, 161,000; Jamaica, 5,000.

The main cause of deforestation in the tropics is people making room for agriculture, subsistence farming, and cattle ranching. Logging, road building, mining, industrial development, and hydroelectric dams also are factors. Most people in the developing world rely on wood for cooking and heating, and the constant hunt for fuelwood nibbles away at the fringes of every tropical forest. The destructive process is aggravated by a relentless spiral of poverty and population growth.

Bird watchers, sensitive to declines in wildlife habitat, have long been concerned about the depletion of rainforests. Some of the earliest and most poignant cries of alarm came from those who saw the relationship between declining forests and dwindling wildlife populations.

In the past decade, tropical deforestation has been moving up on the list of priorities not only for bird watchers but also for national and international conservation groups, such as the World Wildlife Fund, The Nature Conservancy, and National Audubon Society. And recently the subject has penetrated the American consciousness. Dr. Norman Myers, a globe-trotting scientist-journalist who lives in Oxford, England, published *The Primary Source: Tropical Forests and Our Future* in 1984. American journalist Catherine Caufield released *In the Rainforest* that same year. Since the publication of these two seminal works and with increased attention to the issue from leading natural history journals, most environmentally aware people on both sides of the Atlantic are cognizant of the tropical deforestation crisis.

The urgency of the issue can be summed up in its central facts: Tropical forests cover just 7 percent of the Earth's surface yet contain an astounding one-half of the planet's living species. This inexpressibly rich biome is being destroyed at the rate of 50 acres per minute; in one year, an area equivalent in size to Ohio is lost.

About one-half of the world's rainforest has been burned or cut down since the turn of the century. Most of the remaining rainforest is in Amazonia—Brazil alone has one-third—southwest Asia, West Africa, Indonesia, Zaire, Mexico, and Central America.

No one expects to "save" the remaining rainforests in the same way that we can, by common consent and legislation, put aside a piece of wilderness. But much can be done to slow the destruction of what Dr. Myers calls "the greatest celebration of life on Earth."

Because the problem affects so many people as well as biological and economic pro-

In Madagascar, workers view damage from road construction (left) and native couple sit in hut near cut and burned land (above). At last fall's rainforest conference in New York City, Madagascar's ambassador Leon Rajaobelinn said natural resources are the backbone of economic progress and to destroy them overnight is to leave one's country an "economic basket case."

cesses, specialists of every stripe are getting involved—from agronomists to zoologists. A conference hosted by the New York Rainforest Alliance in New York City last October demonstrated how widespread is the concern for tropical ecosystems and how passionately they are being defended. Rainforest conservation has gone beyond the province of bird watchers and biologists. The conference drew bankers, politicians, foresters, and human rights advocates.

Dr. Ghillean Prance, senior vice-president for science at the New York Botanical Garden, opened the conference with a treatise entitled "Interdependence and Responsibility." Those of us in the industrialized world depend on the tropical forests in many ways, Prance said, and the forest depends on us. We are the beneficiaries of the rainforest and also its destroyers. Some benefits we derive from the rainforest are distant and impersonal. Tropical forests affect world climate, for example, and the smoke from thousands of acres of burning forest contributes to the "greenhouse effect"—a gradual and ecologically disruptive global warming.

Other connections are closer to home. Even in the industrialized nations, we enjoy a long list of rainforest products, including fruits, nuts, spices, gums, resins, fibers, pulpwood for paper, and fine woods such as mahogany and teak.

Some of these products, Dr. Prance said, can be harvested on a sustainable basis without seriously degrading the forest. Brazil nuts, for example, were a $25-million cash crop for Brazil in 1985. Rubber, which is still essential for many products despite the predominance of synthetics, can be tapped from wild trees. India's wild forest harvest of perfumes, flavorings, resins, rattans, essential oils, and drugs is worth $125 million every year. Timber and cocoa can be grown on plantations. But many products are exploited: mahogany and Brazilian cherry, for example, have been virtually eliminated in parts of the Amazon. These and other tropical hardwoods are used in this country to make luxury furnishings and glossy veneers.

Birds provide another direct connection. Many of "our" birds, including tanagers, warblers, flycatchers, thrushes, and some hummingbirds, winter in the mature forests of the tropics. National Audubon Society ornithologist Dr. George Powell, who studies the hooded warbler, says that as many as 100 North American species winter in the rainforest.

Because these pan-American migrants face so many life and death variables, Powell and other scientists cannot yet measure the impact of tropical deforestation on songbird populations. But, Powell says, we cannot remove their wintering habitat and expect the birds to adapt. He and other researchers are studying the effects of forest fragmentation on wildlife populations. If we can save only pieces of the rainforest, the biologists want to know how big the pieces must be.

Dr. Prance, Dr. Myers, and a number of other speakers at the New York City conference emphasized that because so little research has been done in the rainforest, we don't really know what is being lost as the forest falls to chainsaws and settlers' torches. While we can't even estimate to the nearest order of magnitude how many species the planet holds, we are witnessing the greatest spasm of extinctions since the calamity that claimed many life forms, including the dinosaurs, 65 million years ago. This massive loss of biological diversity is converting scientists into rainforest activists. The world's richest gene pool is being drained before we can even assay the wealth.

Another compelling reason to protect the rainforest is that millions of people, in more than a thousand tribal groups, live in the forests and depend on them for their existence. International environmental groups agree that we have much to learn from those who have lived in harmony with the rainforest for hundreds of years and that the best conservation efforts are locally managed by forest inhabitants.

Dr. Mark Plotkin, another speaker at the conference, is an ethnobotanist who lives with Amazonian tribes in order to study how they use plants. Because their cultures have been disrupted, tribal elders are not passing folk wisdom down to the next generation. Wizened witch doctors are storehouses of unique knowledge, and Dr. Plotkin emphasized that "every time one of these herbalists dies, it's like a library burning down."

Indigenous peoples know how to use and conserve the forest in hundreds of ways that we may never realize. International aid organizations have learned that conservation or restoration programs, such as reforestation projects, cannot be imposed by outsiders. Local rainforest peoples must be involved in the planning and execution of forest-saving projects if they are to succeed.

TERRY THOMPSON

Industrialized nations benefit from many rainforest products, including exotic spices and healing herbs. Rosy periwinkle from Madagascar, below, provides alkaloids used to fight leukemia.

FRANS LANTING

Putting aside the aesthetic, ecological, and humanitarian arguments for tropical conservation, the practical benefits alone should mobilize rainforest advocates. A typical Amazonian tribe uses 300 kinds of plants for everything from making deadly arrow tips to inducing prophetic dreams. Traditional healers in Southeast Asia use some 6,500 plants in treating disorders ranging from malaria to syphilis. Researchers from the National Cancer Institute have found that as many as one in ten plants from Latin America have properties with cancer-fighting potential. The rosy periwinkle from Madagascar provides alkaloids used to fight leukemia. Quinine comes from the bark of a rainforest tree. The active ingredient in many birth control pills comes from wild yams.

Horticulturists depend on hearty wild genes to create new hybrid crops. A strain of perennial corn found growing wild in Mexico was crossed with modern varieties. The resulting hybrid could save farmers millions of dollars annually in replanting costs. A coffee plant with caffeine-free beans recently was found in the forests of Madagascar. Natural sweeteners, some 100,000 times sweeter than sugar, have been isolated from several tropical plants. The sap of Amazonian copaiba trees is nearly identical to diesel fuel and even in its raw state can power a truck.

The banking community also has been drawn into the rainforest debate. The World Bank—which has financed projects that destroy rainforests on a mammoth scale—has been forced to evaluate the environmental consequences of projects it funds because of pressure from conservation organizations. R.J.A. Goodland, a World Bank representative speaking at the conference said, "If conversion of tropical forests created sustainable jobs or permanent benefits, it would be difficult to fight; but it does not." The farmer who has burned a patch of rainforest to grow one or two crops of manioc before the thin soil plays out has gained nothing of lasting value. The logger who cuts trees to ship to industrialized nations has earned short-term wages at the expense of long-term destruction of his primary natural resource.

Commercial bankers, with billions of dollars on loan to Third World countries, are beginning to sound like conservationists as they realize that the loans will be repaid only by those countries that can manage sustainable development. This requires sound husbandry of natural resources, and the rainforest is the primary resource for many countries now deep in debt.

Leaders of some tropical countries are realizing that economic progress cannot be sustained without environmental protection. Madagascar's ambassador, Leon Rajaobelinn, said: "There is a clear relationship between [national] debt and deforestation." Natural resources are the backbone of economic progress, he said, and to destroy those resources overnight is to leave one's country an "economic basket case."

If the forests are to be saved, most conservationists agree, local forest dwellers will have to lead the fight. One of the most promising developments is the blossoming of citizen groups in communities throughout the tropics. Representatives from such groups in Africa, India, and Latin America were at the New York conference explaining how they organized to protect their forest from outsiders. In many

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Chris Wille is vice president for conservation information of the National Audubon Society and editor of *Audubon Activist.*

cases, they are fighting American and Japanese corporations exploiting the forest for timber or razing it to grow citrus, sugar, or cattle.

Local groups have begun by blockading bulldozers and logging trucks. Conservation groups in this country are negotiating "debt-for-nature" swaps, whereby a piece of a tropical country's debt is bought (deeply discounted) in exchange for a promise to protect designated forest areas. Congress is processing legislation that calls upon the World Bank to allow countries to pay off part of their debt with conservation easements, agreements to put good husbandry of natural resources first in plans to develop designated areas.

The United Nations, in collaboration with governments and conservation agencies around the world, has produced the Tropical Forest Action Plan, which is stimulating both awareness and action. Because the plan has the U.N. seal of approval, it has brought forestry into high-level government discussions around the world. Conservationists hope that ministers of forestry in tropical countries will someday attain the same levels of national influence as ministers of war or economy. Hundreds of projects, sponsored by the U.N. plan, are under way, from tree planting in Nepal to construction of fuel-saving stoves in Senegal.

North Americans are becoming increasingly aware, as Dr. Myers says, "of whose hand is on the chainsaw." A lot of rainforest is razed on behalf of U.S. consumers, to grow our coffee, citrus, cocoa, and sugar; to provide us with rich, dark hardwoods or paper pulp; to make quick profits to service debts held by our banks. In one of the most famous links—the "Hamburger Connection"—many American consumers learned that Latin American forests were being burned to make pasture to raise cheap beef for U.S. fast-food chains. After several environmental groups organized a boycott of Burger King, the most blatant offender, the hamburger outlet announced last summer that it would no longer buy rainforest-raised beef.

We can influence environmental policies in tropical countries by encouraging changes in foreign aid that would reward good stewardship of natural resources, and by continuing to pressure the World Bank and other international lenders to evaluate the environmental consequences of projects they support.

Several qualified observers who spoke at the conference speculated that, by the end of this century, the world's remaining tropical forests will be reduced to biologically isolated fragments. If this generation fails to save the rainforest, they claimed, our descendants will not have the opportunity to try.

Conserving the rainforests is the greatest and most urgent conservation challenge of our era. It's a complicated mix of global economics, politics, ethics, and biology, but if each of us took on a small piece, such as not buying tropical hardwoods, writing our legislators, and joining an environmental organization with a rainforest program, we could help ensure that the wildlife and people who depend on the rainforests will survive into the next century.—**Chris Wille**

Seven Ways to Save a Rainforest

It is easy to deplore the destruction of tropical habitats worldwide. Doing something about the problem is the next step. Contributing money to organizations working on international conservation can salve our consciences and certainly will help in the long run. But just as important, as affluent American consumers each of us can help slow tropical forest destruction with a little change in thinking. Simply stop buying items whose production entails the rape of remaining rainforests.

- **Do not buy tropical wood or its products.** Avoid teak, mahogany, rosewood, lauan plywoods or chipboards, rattans, disposable chopsticks. Don't even buy veneers made from tropical wood.

- **Do buy products made of native American wood** such as pine, oak, and maple.

- **Do not buy hamburgers at fast-food restaurants** unless you are sure the beef did not come from tropical pastures.

- **Do not buy exotic pets** such as birds, snakes, turtles, or fish, unless you are sure they were bred in captivity and not caught in the wild.

- **Do not buy any products made from tropical animals.** Avoid snakeskin, tortoiseshell, furs, feather jewelry, and the like.

- **Vacation in tropical countries, but** don't go there just to lie in the sun. Also visit and learn about the country's natural areas. By hiring local guides and buying field guides and other products that emphasize the region's natural history, you can exert the pressure of your tourist dollars, which will help convince developing countries to preserve their natural heritage.

- **Donate money to organizations working for tropical conservation.** Specify that the money be used for purchase or protection of tropical land. Brazilian conservationists working with the World Wildlife Fund have said that $60,000 will purchase over one million acres of Amazonian rainforest. An additional $20,000 a year will manage and protect the forest in perpetuity.

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—*Mark Pokras*

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ROBERT C. SIMPSON (VALAN PHOTOS)

Eastern Bluebirds

Who does not welcome the beloved Bluebird and all that his coming implies? His cheery warble, heard at first as a mere wandering voice in the sky, heralds returning spring. There must be something wrong with the man who hearing this brave and happy bird and seeing him fluttering and warbling in his lovely vernal dress, does not feel a responsive thrill.—Edward Howe Forbush, *Birds of Massachusetts*, 1929

One of the season's earliest nesting songbirds and harbinger of spring, the eastern bluebird has long been one of our most popular birds. Once a common dooryard bird that nested in natural cavities in orchard trees and fenceposts, the bluebird has experienced a population decline during the past 50 years. The reasons?—loss of the open farmland nesting habitat that the bird prefers, and competition for nest holes with the house sparrow and European starling. Both introduced species are more aggressive than bluebirds when obtaining and defending nest cavities—a scarce commodity since the trees and wooden fenceposts of the small farm have been replaced by the metal fenceposts of larger enterprises.

Fortunately, bluebirds will nest readily in bird boxes. Thanks to encouragement from the North American Bluebird Society, thousands of birders have put up bluebird nesting boxes, and the species is making a comeback in many areas. For example, in our part of eastern Massachusetts, bluebirds are nesting where they haven't in the past 20 or 30 years.

Although bluebirds have been well studied over the years, recent research is uncovering new mysteries about this bird. One discovery involves the bluebird's aggressive defense of its nest holes from other bluebirds.

Pat Gowaty, an ornithologist at Clemson University in South Carolina, has conducted long-term field studies on bluebirds and found that they defend their nest holes most intensely during nest building, especially during the egg-laying stage, but their aggressiveness tapers off dramatically during the incubation and nestling phases. This behavior is true for both the male and female.

She also found that individual bluebirds do not show aggression toward intruding bluebirds of the opposite sex, but they do show it toward

Donald and Lillian Stokes are authors of Stokes Nature Guides and the newly published *Bird Feeder Book*.

their own sex. Male bluebirds act very aggressively toward other males that enter their territories, and female bluebirds fiercely defend nest holes against other females. Sometimes their fights even lead to the death of one of the birds.

Why would females fight so fiercely with other females, risking injury and death, during the nest-building and egg-laying phases?

Why is territorial defense strongest during nest building and egg laying? And why are males and females so aggressive toward members of their own sex?

Gowaty proposed two straightforward explanations for male aggression: the male is guarding his mate so that other males cannot copulate with her; and the male is guarding his valuable nest site from takeover by another male.

But why would females fight so fiercely with other females, risking injury and death, during the nest-building and egg-laying phases? Gowaty's theory was that a paired female might be trying to prevent intruding females from laying eggs in her nest, a practice known as egg dumping.

Before Gowaty's work egg dumping was known to occur in nonpasserines, such as wood ducks, but no one had documented the behavior in passerines. In a landmark study in 1984, using new biological techniques to determine the genealogical relationships between breeding adults and their offspring, Gowaty and A. A. Karlin analyzed blood samples from 257 color-banded bluebirds.

Although bluebirds have always been considered monogamous, Gowaty and Karlin discovered that 9 percent of the nests contained young of multiple parentage, that is, not all members of these broods had the same two parents. Although two bluebirds may have been a mated pair that were raising a brood, they were not necessarily the real parents of each individual in the brood.

Multiple parentage can occur in three ways. There may be more than one father of a brood if the female, either by choice or force, copulated with another male besides her mate. There may be more than one mother of the brood if the male copulated with another female besides his mate and that female laid her eggs in the box. Or an outside female may copulate with an unknown male and enter the box to lay her eggs. In this case the bluebird pair would be caring for a nestling unrelated to either of them.

In light of Gowaty's findings, the patterns of aggression for bluebird pairs during nest building and egg laying become understandable. Paired male bluebirds may act aggressively toward intruding males at that time for two reasons: they do not want their nest box usurped, and they do not want their mate to copulate with another male. Female bluebirds may act aggressively toward intruding females because they do not want those females to dump eggs.

PEGGY M. CAVANAUGH (2)

Left, eastern bluebirds use nesting boxes to supplement the dwindling supply of natural cavities. Above, eastern bluebird eggs and young. The bluebird was once thought monogamous, but mated pairs have been found raising young that were not their own.

Ornithologists have theorized that egg dumping has evolved only in birds that nest in tree cavities because of the fierce competition for limited nest sites. However, new evidence has revealed that egg dumping also occurs in birds that nest in open cups where there is less competition. In a recent study by Gowaty and C. J. Davies at Cornell Plantations in Ithaca, New York, Gowaty discovered that egg dumping occurs in American robins, which are open-cup nesters, at a rate several times higher than in bluebirds.

More studies of this behavior are needed. We are just beginning to discover the forces that shape birds' lives, even common and presumably well-known birds.

—Donald & Lillian Stokes

Putting a Dead Bird to Roost

Here is a story, a story of birding's beginning. It is almost allegorical in its portrayal of the revolution that altered the way birds are perceived, but it goes one step further. It is true and accurate.

So accurate that it contains a tragic flaw. Even though an ornithological age was toppled and a new age was born, a vestige of the old school lingered. On a front lawn in Connecticut the story begins sometime in the thirties. It has never been finished.

DOUG PLUMMER

Here is the end of the story, written the only way it can be written.

In the beginning, before Questar scopes, before Peterson guides, there were shotgun ornithologists. When they saw a bird they shot it. They did this in order to find out what kind of bird it was.

"But why did they have to kill it?" you ask.

Because there was no other way. They could not say: "Bird, what is your name?" because birds don't know their names. They could not say, "Bird, stay where you are so I may study you," because birds are suspicious; they fly away.

So, ornithologists were obliged to shoot birds in order to examine them.

In the beginning nobody knew any of the birds because they did not have names. Every time a bird was shot that had never been shot before, it got a name. All of the names were put on a list. Today, the list is known as the *American Ornithologists' Union Check-list of North American Birds*.

In time, all of North America's birds (and most of the birds in the world) were shot and named. Occasionally, birds that appeared on somebody else's list wandered to North America. When this happened, they were shot and added to our list.

Shortly after the War of the Rebellion, something happened that changed bird study forever. A device was invented that made distant birds appear close. The device was called a field glass and with it a field-glass ornithologist could study a live bird almost as well as a shotgun ornithologist could examine a dead one.

These were exciting times. Live birds were more animate than dead ones and more interesting. People began to appreciate and value living birds. And then they discovered something quite remarkable . . . which brings us to the great allegorical story, the one that has never been finished.

One day Ludlow Griscom, who was to become the dean of modern ornithology, was standing in a front yard in Connecticut with a member of the prestigious Linnaean Society. Young Ludlow had the temerity to suggest to his older companion that it was not necessary to shoot a bird in order to identify it. To illustrate this, he focused his binoculars on a treetop passerine and identified it as a female Cape May warbler.

Skeptical, the shotgun ornithologist fired—and *mirabile dictu*—it *was* a female Cape May warbler.

Griscom did this repeatedly and each dead bird confirmed his point: You do not have to kill a bird in order to identify it correctly.

But at the moment of birding's triumph, the old school played an ace. "Yes, young man, quite right, but the bird must be collected to prove you're right. I will not trust your eyes; I trust only my gun."

It's the story of creation with The Fall built right in. It's the apple in the garden with the bite already taken.

Sixty years have passed. Field-glass ornithology has eclipsed the efforts of our ancestors. Our optics and skills permit us to separate species that the shotgun school couldn't distinguish in the hand—didn't know, in fact, were separate species.

Even so, to this day, for a new species of bird to be accepted on the North American check-list it must be collected or documented by an "unequivocally identifiable photo."

I want to know how many times Griscom must be right before the new reality supplants a dead rule. How many times does water have to put out fire before we accept that water puts out fire?

In July 1987, in the 36th supplement to *The Auk*, the journal of the American Ornithologists' Union, the check-list committee updated the list of North American birds. In it is this reaffirmation: "The committee feels that acceptance of non-specimen records based on high probability but not subject to complete verification should be avoided and that it should adhere vigorously to its criteria."

Enough. It's time the story was finished.

I am a descendant of Griscom and his methodology and this is what I believe.

I believe that a live bird is more important than a dead one.

I believe that killing any bird for the sake of documentation or certification is unwarranted and indefensible.

I believe that birds are as identifiable in the field as they are in the hand.

I believe, for the sake of verification, that the accuracy of careful, well-documented field identifications serves any reasonable scientific ends.

I believe that the A.O.U.'s advocacy of specimen records for inclusion in the North American list is an anachronism predicated upon a philosophy that died over 60 years ago.

If the A.O.U. does not accept the legitimacy of accepted field identification practices, then I do not accept the legitimacy of the *A.O.U. Check-list*.

Let them shepherd their list of dead birds. My interest is living birds.

The story is finished.

—**Pete Dunne**

CYNTHIA M. KLOTZBACH

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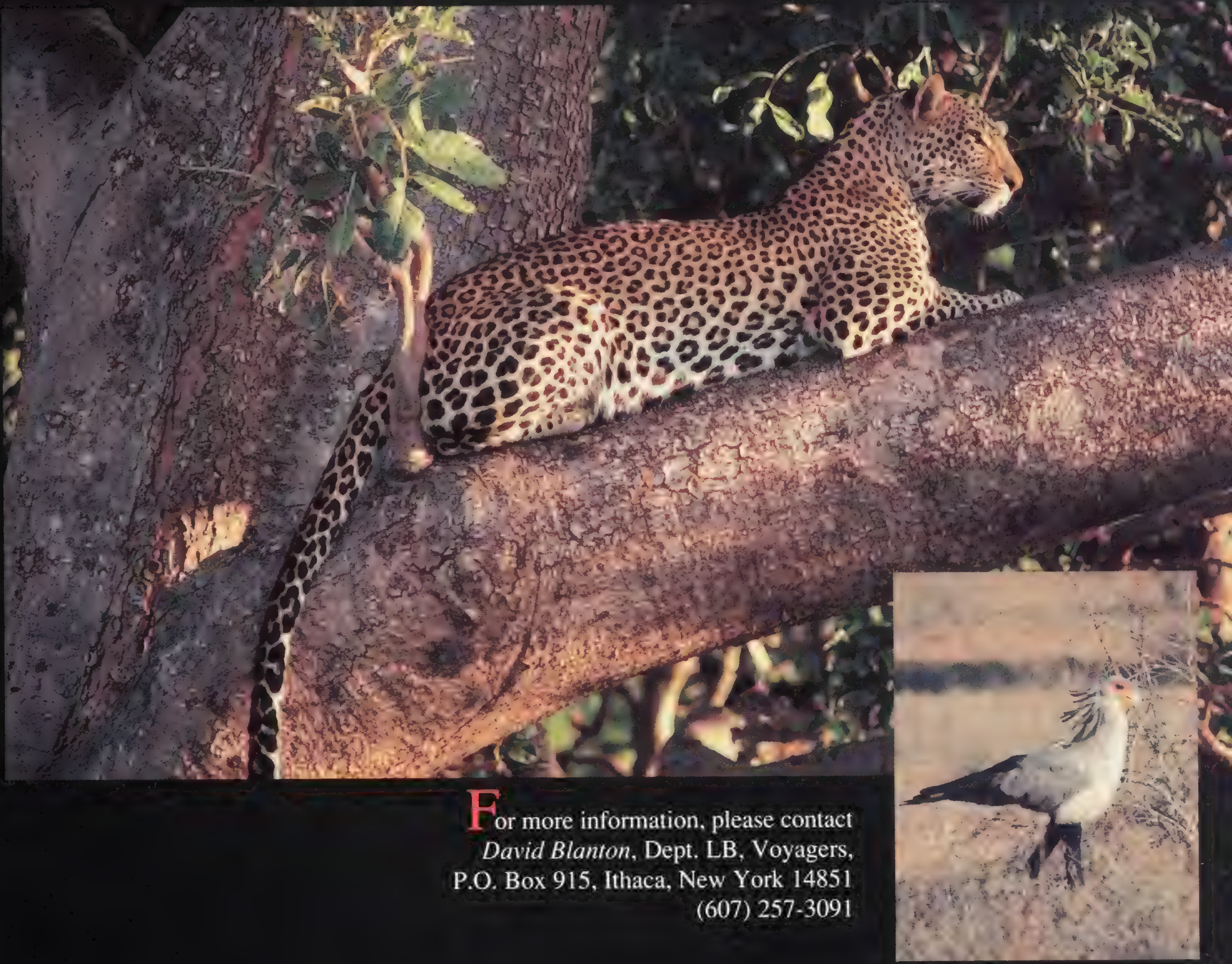

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Front Cover: Yellow-billed hornbill, a common resident of savannas and dry woodlands in southern Africa. The female uses her huge bill to plaster herself into her nest hole with mud and droppings. When the young are about half grown she breaks out of the hole and helps her mate to feed them. Photograph by M. P. Kahl (Bruce Coleman Inc.). Our front cover was printed thanks to a generous gift from Hurbert Zernickow. **Back Cover:** Roseate tern, a bird recently added to the endangered species list (see page 5). Photograph by Pat Lynch (Photo Researchers, Inc.).

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Violence in Sparrowdom

The Autumn 1987 issue contained a letter from Alice Honea of Taylor, Michigan, describing a female house sparrow holding a male by the cheek. You asked to hear from anyone else having witnessed this behavior and, no doubt, have been inundated with responses. *(Ed. note: we received six.)*

For some 17 years we lived in the foothills west of Denver, Colorado, in an urban habitat. Our feeders attracted multitudes of house sparrows, and each year we witnessed the described behavior of females grasping males in their beaks, even throwing them against limbs of trees. Upon first observation I was shocked, but as the years progressed and I saw and heard the constant chittering, strutting, and tail-fanning behavior of the courting males, I developed empathy for the females. Perhaps they were trying to rid themselves of this persistent, raucous, and demanding behavior.

H. M. Lee Johnson
Sequim, Washington

An incident at one of my feeders some years ago: house sparrows low in the pecking order and with insufficient aggressiveness to oust other, larger species, would grip the shelf with their feet, using it as a fulcrum to swing up and purloin a seed. A starling, upright on the tray, saw what it might have taken as a worm, picked up the sparrow by the toe, and dangled the fluttering bird for several seconds. The otherwise phlegmatic starling registered surprise and bewilderment. I registered surprise upon realizing that a starling could hold such weight in that fashion.

Wm. C. Mansell
Mississauga, Ontario

I have not seen the behavior Alice Honea describes. But here is a similar description, excerpted from "The Sparrow" by William Carlos Williams.

I saw once,
the female of his species
clinging determinedly
to the edge of
a water pipe,
catch him
by his crown-feathers
to hold him
silent,
subdued,
hanging above the city streets
until
she was through with him.

Paul Williams
North Kansas City, Missouri

AHHHHH Fitzharris

Thank you for "AHHHHH Africa" by Tim Fitzharris (Winter 1988). For many years I have felt that Tim is the best bird photographer I've encountered, and his writing has always been informative and entertaining. In this article his words reach the level of emotion evoked by the transmittal of his vision to film—he has said it the way we all feel but can seldom express.

Don Johnson
Sequim, Washington

Just having returned from Kenya and Tanzania, I found "AHHHHH Africa" wonderful. I must point out a mistake, however. On page 17, Fitzharris mentions that he encountered water buffalo. The correct name is African or Cape buffalo; the water buffalo occurs only in Asia.

Phyllis Dague
Ithaca, New York

Less Is More

We couldn't disagree more with the request from Chris Siddle in the Summer 1987 *TLBQ* (159 Sapsucker Woods Rd.) to "extend each issue by 20 pages or more and abandon the huge spreads of decorative material." Most other publications we receive are so massive we have time to read only one or two brief articles before consigning them to the oblivion of the bookshelf. But *TLBQ*, with its pithy articles written in simple, nontechnical language, is a pleasure. It is one magazine we do read from cover to cover, and we find the decorative material enhances our enjoyment.

Syd and Magda Schoenwetter
Miami, Florida

Pisher's Corner

I'd like to add a postscript to Pete Dunne's essay on pishing (Winter 1988).

Last year I went to Point Pelee, Michigan, after the migration was over and the birders gone—or so I thought. As I strolled along a trail I heard the sound of pishing, so I waited to see who would come around the corner. Then I heard several more pishes, with slight overtones of exasperation, coming from farther away. I followed the sound, only to hear it move again. Now the pishes were coming loud and strong from a nearby bush! The pisher was a gray catbird, practicing all sorts of pishing variations—short, long, *sotto voce,* exuberant, tentative, and experimental.

If that talented bird keeps on learning, we may have some rather remarkable birds reported at Point Pelee.

Rosemary Gaymer
Oakville, Ontario

As one who also has spent many years pishing in the wind, I would like to comment on Dunne's statement, ". . . many believe pishing mimics the alarm calls of birds." I disagree. I believe pishing mimics the scolding calls given by birds when mobbing a predator.

The alarm calls of birds are short, high pitched notes that birds respond to by fleeing, hiding, or remaining silent and motionless. But when birds respond to pishing, they call, move closer, and become agitated. Next time you see small birds mobbing an owl, snake, or cat, watch and you'll notice all the birds in the area coming to the scene, acting agitated and giving scolding notes. You can even join them by pishing at the predator.

I suggest that passersby would not be alarmed by Pete's pishing but rather would swarm to his aid.

Steven Sibley
Ithaca, New York

As one pisher to another, I endorse your concept that birds responding to pishing are scolding rather than being alarmed. I take umbrage, however, at your assertion that mobbing birds are agitated. Amatz Zahavi's work on Arabian babblers suggests that mobbing is the avian equivalent of showing off. Agitation, however, denotes a negative response to a stimulus. Clearly "agitated" is semantically slanted. The correct term is "excited."—P.D.

FROM THE EDITORS

We would like to introduce our newest contributing editor, Jack Connor. Jack directs the creative writing program at Stockton State College in Pomona, New Jersey, and has authored a book and numerous articles on birds and bird watching. How did a Ph.D. in English literature become a birder and eminent member of the birding press?

"It took me a long time to appreciate birds," Jack reveals. "My mother was a lifelong bird watcher and my wife, Jesse, tried to interest me in birds for years, but I ignored them.

"Finally at age 28, I arrived in Gainesville to begin graduate school at the University of Florida, and there were so many birds around, I could ignore them no longer. The very first day we drove into the countryside, found a lake, parked the car, and almost immediately a bird came swirling down in a lazy loop, splashed on the water, grabbed a fish from the surface, and flew off. Jesse said, 'That's a bald eagle.' I couldn't believe it. Until then birds had been shadowy figures I'd seen in documentaries, but never encountered in the real world.

"After that I became intrigued with the difficult and complex sport of bird identification. Luckily in Gainesville we made friends with people who had been birding all their lives. We went on a couple of trips with them and I was amazed at how they could drive at 65 miles an hour while identifying kestrels and kingfishers. I had driven past these birds before but had never noticed them. Suddenly I wanted to observe them, puzzle over them. I got hooked on the skill and mental challenge of identification."

And how did he begin writing about birds?

"I've written since the fourth grade and, like many writers, I thought I would produce long novels. At one point I took a year off and tried to make it as a fiction writer, but it didn't work out. I then decided to get a Ph.D. in English so I could teach college, and two things occurred simultaneously. I developed an interest in birds and became an academic. Then a funny thing happened. I started writing a column in the newsletter of the local Audubon Society chapter. I didn't think of this as serious writing at all, and didn't even sign it, but the more columns I wrote, the more engrossed I became. So, for school I was writing academese about literature, and on the side I was writing this secret birding column.

"Then I wrote an article on ospreys, signed it, and sent it to the Gainesville newspaper. I remember thinking how embarrassed I'd be if someone from the college saw it. Naturally, the first person to see it was an academic colleague. He said, 'Did they pay you to do that?' 'Yes,' I said, '25 bucks.' 'Boy,' he said, 'I've been publishing for 25 years and I've never been paid a dime.'

"And something clicked in me. I realized that writing for an academic audience was a terrible struggle. If you found five people to read and respond to one of your articles, you accomplished something. I didn't want that. I wanted much bigger audiences. From then on my writing and academic interest diverged and they've been diverging ever since. I want to write for large audiences and get them excited about birds."

We hope you do just that, Jack, in your new column and the features you'll be writing for us.

The roseate tern, a graceful flier named for the faint rosy tint on its breast feathers, is the newest addition to the U.S. list of endangered species. According to the U.S. Fish and Wildlife Service, the bird has been declared endangered in the northeastern United States, where its numbers have dropped to fewer than 3,000 breeding pairs, and is threatened in the Florida keys and the Caribbean, where its numbers are uncertain.

The primary cause for the species' decline is competition with expanding populations of great black-backed and herring gulls, large and aggressive birds that displace the terns from their traditional nesting islands.

We are sad to note the passing of two longtime friends of the Laboratory.

John S. Dunning, ardent supporter of South American conservation and author of four books on neotropical birds including the landmark *South American Land Birds: A Photographic Guide to Identification,* died last December. John retired from business in 1964 and, with his wife Harriet, devoted the rest of his life to studying and photographing South American birds. He was a member of the Laboratory's administrative board from 1971 to 1977 and a Laboratory Associate from the late 1960s until his death. In a recent letter to Charles Walcott, John wrote "[my Laboratory associateship] is especially important to me as the years when I was very active in the Laboratory were so important in leading me to my present condition of all-consuming interest in South America. My gratitude to the Laboratory is immense."

We, in turn, are grateful to John.

Mary Fuertes Boynton, longtime Lab enthusiast, passed away last February. Mary was best known to the Lab as the resident expert about the art and life of her father, Louis Agassiz Fuertes. Mary inherited her father's enthusiasm for birds and bird art and shared her excitement with everyone she met.

In 1956 she wrote a biography of Fuertes, who lectured in zoology at Cornell University in the early part of the century and was considered the world's foremost painter of birds at the time of his death in 1927. In 1979 Mary presented Cornell with her father's complete papers, including 2,500 sketches and paintings. And in 1987 she wrote the sketch of her father's life that now accompanies the Lab's permanent display of Fuertes's works. For all her help and support, we are thankful.

It Takes More Than Worms

Keeping the Lab alive and healthy requires a nourishing funding diet. Typically this consists of membership dues, special gifts, and bequests. There are other ways, however, that you can fuel our efforts. Consider gifts of long-term appreciated securities or gifts of closely held stock.

In many cases, gifts of appreciated stocks or bonds are more advantageous to the donor than gifts of cash. They generate a charitable income tax deduction and may eliminate tax on the capital gain.

Help round out the Lab's funding diet. Take advantage of these alternatives. For more information, please contact Scott Sutcliffe, Director of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607)254–2424.

Chasing Rarities

For years I have had a rule against chasing rare birds that other people have located. In practice that has meant not being part of the phone tree on our bird club hotline, not calling the state Rare Bird Alert every week to learn what and where the current prize birds are, and turning a deaf ear to excited reports from my birding friends. The time and expense involved in chasing rarities were two good reasons for the rule. But mostly I disapproved of traveling long distances to stand shoulder to shoulder with scores of other birders while *perhaps* making the brief acquaintance of staked-out birds that were somewhere they shouldn't be. The riotous descriptions I heard and read of the mob scene at Newburyport, Massachusetts during the visitation of the Ross' gull, for example, made me shudder.

Instead, I have had a lot of fun hunting birds on my own or with a few friends. And a great deal of useful field work has been waiting to be done on species I could find in my own neighborhood. (See Jack Connor on that subject elsewhere in this issue.)

But I must admit that I have made exceptions to the rule, and one of those exceptions has recently caused me to look at the rule in a new light. Last winter a Le Conte's sparrow was seen on a nearby central Connecticut Christmas Bird Count, and several days later it was still hanging around in the same place—a small community vegetable garden filled with snow and the stalks of dead plants and piles of garden detritus. Le Conte's sparrow has long been considered to be extremely rare in the northeastern states, and in Connecticut it was so unusual a find that one of my birding buddies touted it to me as "the bird of the century" in the state.

I had never run across Le Conte's sparrow anywhere, and I have a particular interest in bird species that were discovered or named on expeditions led by John James Audubon. Le Conte's sparrow was named during the 1843 Missouri River expedition for one of Audubon's friends, John Le Conte, a physician, educator, and naturalist. So, after grumbling and temporizing for a day or two, I decided to chase this one. The first time I went looking for it, however, I had a poor grasp of what I was looking for and how to find it. The field guides were some help, and friends who had already seen the sparrow told me over the phone where to look and what they had noticed about its behavior. But still I searched in the wrong way, with the wrong mental picture of the bird's habits, and nobody else was there to show me otherwise. I didn't find it.

Often it seemed more like a mouse than a bird, scurrying through the matted vegetation, and one easily lost sight of it there.

I went back the next morning to try again, and with the help of several other birders, including one who had already seen the sparrow there before and had returned to photograph it, I spent more than an hour tracking it around the garden, studying it as it perched in the sunlight, watching its manner of flight and its actions on the ground.

It was a beautiful, pale little bird with a mostly orange-ochre face and a yellow wash on the breast and sides. It had a chestnut and gray collar; its back was strikingly patterned by dark feathers broadly edged with buff; it had a light bluish-gray cheek patch and a black check mark extending back from the eye. Often it seemed more like a mouse than a bird, scurrying through the matted vegetation, and one easily lost sight of it there. I wasn't convinced that it was bothered by all the human activity around it; several times its scuttlings brought it within three or four feet of where one of us was standing. But now and then it flew low to some part of the garden that was empty of people, and sometimes it managed to vanish for a while. That had been the pattern of contact between bird and birders since the Christmas counter found it. In other words, finding this sparrow to begin with had been, in part, the sheerest good fortune.

As a result of the discovery, during the two weeks that the bird remained where it had been found, dozens, maybe hundreds, of birders, having heard the news from their friends or from the state Rare Bird Alert, zeroed in on the vegetable garden and met the Le Conte's sparrow. They stood shoulder to shoulder to watch it; they staked it out to the inch, and many times they "handed" the bird to new arrivals.

All this attention, I decided, was definitely a good

For those who care about such matters the event was as electrifying as the descent of a Martian spaceship. Abed recovering from pneumonia, Paul Buckley, senior scientist for the National Park Service in Boston, promptly got up on hearing the news of the sighting and drove straightaway to Salisbury, Mass. Four Maryland enthusiasts drove all night to the site. One businessman winged in from Los Angeles. Friends desperately tried to get word to an expert vacationing in Africa to return at once. As the week wore on, cars with an array of license plates from across the nation flocked to Salisbury. Battalions of observers armed with telescopes, cameras dwarfed by huge telephoto lenses, sketch pads and binoculars took up daily vigils. They lined the sea wall along one side of an estuary of the Merrimack River and the state beach opposite, eyes trained on the mud flats below.

The cause of the commotion was the appearance of a single squat, unassuming, pigeonlike bird called a Ross' gull, which is almost never seen south of the Arctic Circle, and never before in the continental U.S. It was indeed present and, as if on cue, put on a show for the hundreds of bird watchers by feeding three times each day with a flock of Bonaparte's gulls (named after Charles Lucien Bonaparte, an ornithologist and a nephew of Napoleon) making their accustomed annual visit.

How did the bird get so far south? Ornithologist Roger Tory Peterson speculates that it migrated across the top of Alaska to the mouth of the Mackenzie River in Canada, became separated from its own kind and took up with a colony of Bonaparte's gulls in their summer breeding ground, then flew south with them last fall. Or perhaps it is the victim of a gull's version of an identity crisis. Says *American Birds* Editor Robert S. Arbib, Jr. dryly: "He thinks he's a Bonaparte."—*TIME*, March 17, 1975

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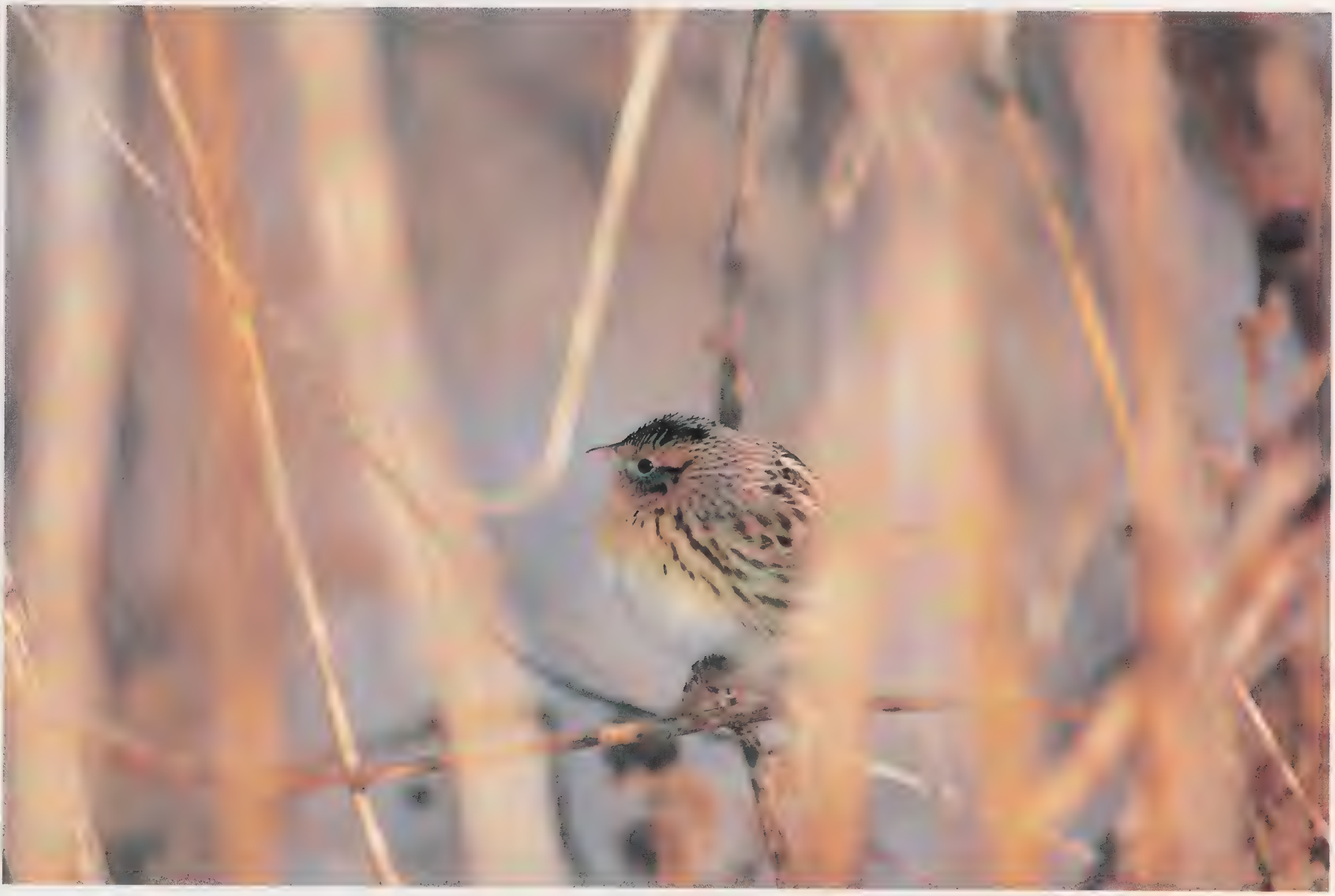
BILL MARTHA



The Le Conte's sparrow seen in Connecticut—a find so unusual it was touted as the state's "bird of the century."

thing. Ornithologists know relatively little about Le Conte's sparrow so far because its mousy deportment and its usual habitat—dense, wet grasslands—make it difficult to observe. The celebrated sparrow in the garden and the steady stream of people who kept watch over it provided many local birders their first opportunity to observe the species and learn how to look for it. Just as important, they got the idea that they *ought* to be looking for Le Conte's sparrow in Connecticut. Photographic slides of this beautiful individual have also been shown at many bird-club meetings, and birders who saw the sparrow have described the experience in detail to birders who missed it. Bookish birders like myself have been stimulated to explore the literature about Le Conte's sparrow and its occurrence in the Northeast. Because of this one staked-out bird, the likelihood of the species being found again in Connecticut, if it does visit the state regularly, has vastly increased.

Knowledge breeds more knowledge. The Le Conte's sparrow's known breeding range, once confined to the north-central plains of North America, has been expanding eastward. Now it reaches across Ontario and Quebec almost to the northwestern shore of the Gulf of St. Lawrence. The known winter range now includes much of the South, not just the coastal states, as it used to. Le Conte's sparrow was not even mentioned in E. H. Forbush's *Birds of Massachusetts and Other New England States* (1925–1929), but it has recently been found with some regularity—though not every year—on the Massachusetts coast in fall and winter, and in 1984 it was even recorded on the Cape Cod Christmas Bird Count. Whether all this expansion reflects an actual enlargement of the range or just better field work by professionals and amateurs is anyone's guess, but personally I incline toward the latter explanation.

The presumed rarity of any bird in any given place can be the result of human ignorance. The discovery of a rare bird on the fringe or out of its known range, followed by a gentle invasion of inquisitive birders, can lead to better informed field work and, eventually, to a clearer idea of the range and behavior of that species. So a single scurrying Le Conte's sparrow has changed my mind completely about the virtues of chasing other people's rare finds. Now all I have to worry about is the time and the expense.

—Michael Harwood

TICKS AMONG THE SEABIRDS

David Cameron Duffy

UDO HIRSCH (BRUCE COLEMAN LIMITED)

Millions of seabirds inhabit the 50 small islands off the west coast of Peru. Guanay cormorants, for example, nest in densely packed colonies covering acres (left). During most years the islands are nesting havens that provide protection from predators such as foxes. But in some years the islands become deathtraps, as thousands of adult birds desert their colonies, leaving the young to die in their nests (below). What causes the widespread desertions?

Cities are as beneficial to diseases and parasites as they are to humans. While providing economic and cultural opportunities for people, cities, with their dense aggregations of humans, are ideal breeding grounds for disease—from the plague that struck the Egyptians in the time of Moses, through the Black Death that emptied the cities of medieval Europe, to the flus, colds, and childhood diseases that prosper today, largely unhindered by medical progress.

Similar problems confront other species as well. Densely packed colonies of nesting seabirds, for example, are as vulnerable to disease and parasites as any human city. Parasites live on or inside the bodies of other species, and the more bodies available in a small space, the better for the parasites.

Some of the world's largest colonies of seabirds occur on islands off the west coast of Peru. Here the nutrient-rich water of the Humboldt Current produces enormous blooms of plankton that are eaten by vast schools of anchovies and sardines. These fish, in turn, support millions of seabirds.

Nesting space for all these birds is scarce in this area because predators such as foxes and humans prevent seabirds from breeding on the mainland. Therefore the birds must crowd onto 50 small islands of 20 to 50 acres each, where they nest at densities of about 3 nests per square yard. More than a million birds have been reported nesting on the larger islands.

These islands are a delight to the parasites that depend on seabirds for food, shelter, and a place to reproduce. Year after year the parasites find a reliable supply of seabird victims that have nowhere else to nest. In most ecosystems parasites have difficulty finding hosts on which to live, so they have evolved complex adaptations that put them in the right place at the right time. Parasites such as ticks can fast for years while waiting for a host to blunder past and brush against them. Other parasites attack two or more host species in sequence to ensure that they find the right one for reproduction. Nevertheless, most parasites do not succeed: either they never encounter a host, or they end up on the wrong one. The latter may be uncomfortable for the host, as cat fleas are for humans, but it is disastrous for the parasite, leading to its death or inability to reproduce.

I investigated the effects of parasites on the nesting seabirds of the Peruvian islands as part of the research for my doctoral dissertation on the ecology of Peruvian seabirds. Since conditions are favorable for parasites in the dense seabird colonies, I asked certain questions: Why didn't parasites increase to such numbers that they killed off entire colonies? How did the birds tolerate high levels of tick infestation? The most suitable parasite to study was the tick *Ornithodoros amblus.* Growing to about a third of an inch, it is readily visible, unlike many parasites. Also, it was common on the islands.

Although I was preparing to study the ticks, the ticks decided when the study should begin. I had been examining the nesting habits of seabirds on Isla Mazorca, a small, cliff-bound island off the desert coast of central Peru. The island is bare, vegetationless rock that glistens with a ubiquitous coat of guano. A few houses hug the steep slopes on the sheltered side, the rest is given over to seabirds. The islands are guarded to protect the birds from illegal hunting and egg collecting, and to allow them to nest and produce guano undisturbed. The guano, used since Inca times as fer-

DAVID DUFFY

H. W. SILVESTER (PHOTO RESEARCHERS, INC.)

tilizer, is collected during the nonbreeding season and shipped to the mainland. Almost a million seabirds of seven species nest there, among them guanay cormorants, Peruvian boobies, and Peruvian pelicans.

Three months into my study I returned to the islands from a brief trip to find that my Peruvian boobies were deserting their nests, leaving eggs and young to the mercy of scavenging gulls, tropical sun, and sea mist.

Incubating boobies normally sit tight on their nest or stand placidly shielding eggs or young from the sun. But just before deserting, my study birds were restless, preening frequently, walking around the nest and, most notably, stamping their feet on the ground. I could hear them stamping all night.

Day after day I returned to the study colony to find that new nests had been deserted. In the large colonies of guanay cormorants that nested near the boobies, hundreds of nests also were deserted each day. Curiously desertions did not occur at random but nest by nest, like a wave lapping at the colony.

One day I went through the colony with the island guards, Quechua Indians from high Andean villages who had descended to a warmer and easier, if lonelier, life on the islands. Having lived for years among the birds, the guards knew them better than any scientist could. As we stood in the colony watching the birds, these barefooted gentlemen stood on one foot, then another, then stamped each foot just like the boobies. They explained that the stomping was to shake off ticks that were crawling up their legs. Humans and boobies shared a behavior; perhaps they were both responding to the same stimulus—ticks!

Despite the evidence pointing to ticks as the cause for desertions, I had to consider other possibilities: food shortages, human disturbances, excessive temperatures, and predators. None of these proved likely explanations; however, the conclusive evidence incriminating ticks came on the day I compared the number of ticks in nests of deserting birds with the number in nests away from the desertion area. I found that healthy booby nests had only about 5 ticks per half quart of nesting material, but nests being deserted averaged 200. And these were just adult ticks. The reddish larval ticks were too small, fast, and prone to stray onto the human counting them to assess their numbers. Nevertheless, they were sometimes so abundant in nests that the white down of the young boobies became a deadly pink.

Of the 250,000 nests of cormorants, pelicans, and boobies on the island, roughly two-thirds deserted their nests in a little over a month, with a loss of up to three-quarters of a million eggs and young. Was this normal, I wondered, and if not, what had triggered such appalling carnage?

I was lucky that since 1940 the Peruvians had kept track of the extent of nesting area on each of the islands. I used these records to estimate the frequency of desertions over the years and found that they happened often. Many were associated with the occurrence of El Niño, an irregular oceanographic event that warms the coastal waters and makes anchovies unavailable for the breeding birds. During these times, seabirds on the Peruvian islands desert entire colonies overnight and die by the millions of starvation or diseases caused by malnutrition. When an episode of El Niño is over, the environment quickly returns to normal, so that surviving birds breed and the population increases to its previous level.

Excluding these years, there were many unexplained desertions. On average, 10 percent of all nesting areas were deserted in non–El Niño years. Although I could not prove that ticks were responsible, the frequency of desertions indicated that ticks could have had an effect on population size in the past, just as they were having on my study colonies.

If desertions were common on Mazorca, they might also be common on other islands. To investigate this possibility, I visited seven other islands and discovered that desertions had occurred on five of them. Again, ticks seemed to be the cause. The deserted areas swarmed with ticks, and adult birds spent their time foot-stamping and preening. On Isla Macabi, I estimated that 40 percent of the nest sites had recently been abandoned. On the other islands I found smaller areas of desertions. Ticks appeared to be a widespread problem for nesting birds.

Ticks must have played an important part in the ecology of Peruvian seabirds. Rain rarely falls on the islands off the coast of Peru, and the birds have nested there for perhaps tens of thousands of years. Their droppings have accumulated by the yard and the resulting mountains of guano have provided ticks with innumerable hiding places. Under such conditions, tick populations could have built up to levels that

TED LEVIN

J. E. KEIRANS

One cause of nest desertions is El Niño, an irregular oceanographic event that kills thousands of seabirds by starvation (top). An even more devastating cause is infestations of ticks like the one shown close-up above. In nesting colonies such as that of Peruvian boobies (left), the bloodsucking parasites hide in the guano-covered cliffs, eventually building up to such high numbers that adult birds desert their nests in waves.

Prof. Dr. G. J. Broekhuysen (Ardea Photographics)

The Grisly Drama of Guano Mining

Excerpted from **Bird Islands of Peru: The Record of a Sojourn on the West Coast** *by Robert Cushman Murphy. G. P. Putnam's Sons, New York & London. 1925.*

Turning back the historic pages to the year 1853, we find a notable account of the Chincha islands off the coast of Peru at the peak of the guano period in a sprightly book entitled 'Melbourne and the Chincha Islands' by George Washington Peck, who sailed to Peru from Australia while on a jaunt around the world. Peck sent *The New York Times* the names of one hundred and fourteen vessels which were taking cargoes during his visit. He stated, moreover, that the list was incomplete, owing to constant arrivals and departures. Let Peck review the drama of guano from his tale:

Oct. 2, 1853 . . . The Palace of the Governor of the Island is a large flat-roofed shanty constructed of rough boards and the canes and coarse rush matting which answers generally for the commonest sort of dwellings in Peru. It has, if I remember correctly, two apartments, with a sort of portico, two or three benches, a table and grass hammock in front surrounded by a low paling, forming a little yard, where a big dog usually mounts guard. One of the apartments is probably the store-room; there is a kitchen shanty adjoining the piazza on the side most exposed to the sun. The other is the bed-chamber and dining-room of the Governor and his aids. It contains three or four cot beds, an old table and writing desk, and is decorated with a few newspapers, colored lithographs, and old German plans of the battles of Frederick the Great. Over the Governor's couch are some cheap single barrel pistols; the floor is guano. The situation overlooks nearly all the shipping between the Middle and North islands. The noise of the surf comes up here in softened monotone; below are a hundred tall vessels—the North island with its strange rocks and dark arches fringed with foam—in the distance, north and east, the hazy bay of Pisco lying in the sunshine, and if it be afternoon, the snowy Andes. . . .

We went upon the edge of the cutting, where the Chinese coolies or slaves who are the only laborers here, are employed daily in cutting away the hill with pick-axes, and conveying the guano to the edge of the cliff in barrows. From the shipping the cutting appears almost perpendicular, and the slaves are just visible here and there on the side like so many insects. But from the top it is seen to slope at a convenient angle for pushing down the guano as fast as it is picked away and broken up to be loaded into the barrows at the base. There are about three hundred coolies on the Middle island, and from seven to eight hundred on the north. They are kept at work by black drivers—hideous creatures who walk among them with heavy thongs; they are half naked, and their wild looks and strange cries, with the knowledge of their hard fate, make the scene of their labor a horrid place to look down upon, both at first and ever after. . . .

The guano where exposed to the air, is of a reddish brown, yellow color, darker than that of its general substance, where it is cut away. It of course colors the whole of the islands, the rock on which it rests being only visible round the shores. As it is like light dry earth, and full of holes, it is difficult to walk upon, there being no certainty that every other footstep will not sink in nearly to the knee. If one hurries he is almost sure to fall, or rather to get into it all over, in which case the only satisfaction is in knowing that it is almost pure ammonia, and contains no animal substance, otherwise it might be thought to be an unpleasant sticky sort of soil. A few feet below the surface it becomes compact, and from thence through its whole thickness is of nearly the consistence of Castile soap. Its odor is strongly ammonical, though this is not perceived, or but faintly, in walking over the islands where they have not been dug upon. . . .

Towards the cliff, along the lee side of each island, the surface has a steep slope; on this are placed the mangueras, which reach to the edge of the cliff. These mangueras are large enclosures made of strong canes somewhat resembling the palisade round our prisons. They are supported, as they stand on the inclined rock, by chain cables, four to each, which pass round them at different heights, and are secured above. Into them the guano is brought by wheelbarrows and dirt cars, drawn by donkeys, from the sides of the hill where it is cut away. Coolies, who are obliged to wear thick bandages over their mouths, push the guano down to the lower ends of the mangueras, where there are openings connected with "shutes," or long canvas pipes, about as large round as barrels, that lead down to the bases of the cliff. Through these the guano is conducted into launches, or directly into the holds of vessels loading. . . .

When the guano is pouring down the shute into a ship's hold, she is as completely enveloped and hidden in the yellow smoke of it as if she were on fire with a cargo of lard. The ammonia is so strong that it is like entering a bottle of hartshorn to go into her interior—eyes and nose and lungs are all assailed at once. How the Cholos breathe and survive their labor as "trimmers," to distribute the guano in the hold, where it is so thick as to be almost dark, is marvelous. . . .

As we walked along the edge of the cove behind and within a few rods of the Governor's house, we saw the coolies digging and wheeling, and their taskmasters looking on. A little back were the miserable cane huts where they sleep, and not far from this, within a couple of rods of where they were digging . . . we were shocked by coming upon the dead body of one lying almost naked in the sun, with the face of it covered with flies. It was one, we afterwards ascertained, who had been drowned that morning, whether accidentally or not, nobody knew—or cared. It lay among a number of little heaps or graves, and the turkey buzzards wheeled around it almost in our faces. . . .

MARSHALL SKLAR (PHOTO RESEARCHERS, INC.)

The Peruvian pelican (left) is yet another guano-producing species affected by ticks. But the problem of tick infestation today may not be as great as in past years, for guano mining is now carefully regulated (below). The guano is removed every year or two during the nonbreeding season, preventing ticks from building up to the high numbers of the past.

would have completely prevented nesting attempts on entire islands. Since other ticks of the genus *Ornithodoros* can fast for a decade while awaiting a host, islands may have been left fallow by the birds for years before tick populations starved down to levels that allowed the birds to return.

Much of the guano is gone now, having been mined and exported as fertilizer to Europe and North America in the last century. Faced with the exhaustion of guano, the Peruvians have undertaken a management program, treating guano as a renewable resource. The birds are protected by the Peruvian government, and the guano is removed every year or two during the nonbreeding season. Analysis of my tick census data from the different islands indicated that desertions were highest on islands that had not had guano removed in two years and lowest on those that had been cleared just before the breeding season. The ticks were probably removed with the guano, preventing their numbers from building up. Today, seabirds and humans have achieved a mutually beneficial relationship on the islands: the birds provide valuable guano and the humans, by removing it, reduce tick numbers.

Ticks are not the only parasites of nesting birds. Lice, fleas, parasitic flies, and beetles may all be present in nests. Miriam Rothschild and Theresa Clay, in their book *Fleas, Flukes and Cuckoos,* mention counts of almost 3,500 arthropods in a single nest, and up to 80 species in the nests of some British birds. The exact roles played by many species are unknown. Some are scavengers, but many are known to be parasitic or are suspected of parasitic moonlighting. Given the large numbers of nest-dwelling arthropods, it is amazing that birds rear any young at all.

Birds have evolved a variety of defenses that may reduce problems caused by parasites. Landbirds often construct new nests each breeding season, leaving many parasites behind. Other species nest in locations that make parasitism difficult. This behavior is perhaps taken to an extreme by the fairy tern, which has no nest and lays its single egg precariously in a tree crotch. Young of other species leave the nest at a very early age. This has been regarded as a way of bringing the young closer to food supplies or of reducing the risk of predation at the nest, but it may also serve to reduce the availability of the young to parasites.

Ornithologists have tended to concern themselves with the effects of predators on birds, perhaps because predators are large and conspicuous. Parasites are small, obscure, and often repulsive, but their actions may prove to be just as important to understanding avian nesting behavior. □

David Duffy is a visiting professor in wildlife biology at the Universidad Nacional, Heredia, Costa Rica, where he is working on the conservation and management of macaws and parrots.

Further Reading

Murphy, R. C. *Bird Islands of Peru.* G. P. Putnam's Sons, New York & London. 1925.

Rothschild, M., and T. Clay. *Fleas, Flukes and Cuckoos: A Study of Bird Parasites.* Philosophical Library, New York. 1952.

ZONA-PRUHIBIDA
PARA
LANCHA CHORERA

TED LEVIN

OBSERVING RAILS: THE METHODS SECTION

Text and photographs by Gerald Kaufmann

The essence of scientific writing is its conciseness and precision. The purpose of this style is to improve reading efficiency and to enable professional journals to accept more articles by reducing the length of each one. This style has its failings, however, especially in the section of the articles labeled "Methods." This section includes only those methods that produced positive results. It does not mention those that failed. I submit this is a grave error. First, by excluding failures, subsequent researchers may repeat such fumblings. Second, a complete list of the attempted methods permits the reader to judge the author's persistence, imagination, wit, genius, and ability to generate folly. Here are just a few methods I've excluded. You be the judge.

The study of rails is simple: find a nest, build a blind near it, and write down what you see. How could something so simple become so complicated?

When I was a graduate student searching for a research project, my major professor suggested that I observe the behavior of Virginia rails. The methods, he said, were quite simple: find a nest, build a blind near it, and write down what you see. How could something so simple become so complicated?

Finding a rail nest is a straightforward but laborious affair. Just walk back and forth through the marsh and look into every clump of sedge and cattail. After four hours you will find one. The problem, I learned, was not the finding of a nest, but trying to observe rails near it. As you walk through the marsh you make a path that becomes increasingly conspicuous upon subsequent visits. A clever carnivore will make this discovery: if you follow the human-scented path through the marsh, it will guide you to a meal of otherwise concealed eggs. During my rail work I taught skunks, weasels, or raccoons that trick. I shall never know which since they left no tracks.

My first blind required little effort to build. The idea came as I drove past an appliance store and spied refrigerators in large cartons. They may have been cardboard boxes to most people, but they were blinds to me. They did have their failings, however. They tended to deteriorate at the edge of the water and blow around during storms.

So the next field season I decided to use a burlap blind. I sewed together several gunny sacks, closed the rodent holes, and stretched the burlap over a wooden frame. After several hours of watching motionless for rails, it occurred to me that they were watching my silhouette against the sun.

I then talked my reluctant major professor into lending me his store-bought blind, a canvas-over-wire hide. Wow, I thought, now I'm really a professional ornithologist. What a disappointment! The blind was stifling hot, blew over more easily than a cardboard blind, and silhouetted nearly as well as burlap. My professor was insulted when I told him.

The next year I used black plastic. On the prairie marsh the dawn stillness gives way to a gentle breeze. Black plastic goes crackle, crackle, crackle. Gentle breezes give way to moderate winds. Black plastic goes flap, flap, flap, minor tear, flap, more tear. FLAP, FLAP, FLAP. Obviously, only hardboard or plywood will do.

Proper blinds need proper placement so I positioned my new wooden blind directly in the water near the rail nest and used a five-gallon bucket for a seat. As I

I finally resorted to capturing juvenile rails, sexing them, marking them, and placing them in a breeding pen. When I learned that rails remove colored paint from each others' heads by allopreening, I had to mark adult birds with pieces of plastic attached through their nasal openings with monofilament line.

approached the blind, the friendly red-winged blackbirds hailed my presence to all the creatures of the marsh, including the rails. Well, I thought, once I was in the blind the blackbirds would quit calling. This was not the case, for at least one blackbird could see me through the observation hole. I was just at the level of his song perch. As he continued to call, the rail on the nest performed its hide-from-the-predator behavior. It built a canopy of sedge over the nest, crouched into the nest, and remained motionless.

I sat motionless, too, until suddenly one, a few, then many mosquitoes found prey in the humid blind. I thought, I mustn't slap. I know, I'll just catch them with one hand. Swish! The slightest movement was detected by the red-winged blackbird. Again, he called and called, warning the other marsh birds that a predator was still in there. Again, I sat motionless. Oh, how my legs began to cramp. I thought, if I just slowly move my legs, that won't bother the red-wing. Even though I barely raised my boot, the muck released the heel with a resounding "slurp!" Rails are extremely sensitive to the slightest dribble of marsh water, and the incubating bird renewed its antipredator defense: it thickened the canopy and hid deeper in the nest.

The only answer was to put the blind about 5 feet above the water in the hope that I could observe the rails without inciting the blackbirds. But, because I was farther from the nest, the cattails obscured my view. Well, I'll merely cut the cattails, I thought. Do you know that cattails grow 6 inches a day in the warm June sun? Do you know how quickly this path was found by the local egg eaters?

Later blinds became more sophisticated. After dropping my clipboard several times, I realized that an old rug on the floor would muffle the sound. A roll of fiberglass insulation with the fluffy side up not only absorbed more sound but kept the blind warmer in the early spring mornings on the prairie. Of course the roll fell off my truck and into a roadside ditch. The ditch had a few inches of water which the fiberglass soaked up nicely. As I drove along the highway, several people flagged me down to tell me my truck was leaking gas.

My aching back finally led me to bring a bar stool into the blind, which allowed me to make observations through a single hole either standing up or sitting down. Eventually I put the blind back in the water and used one-way glass on the window and observed rails without inhibiting their movements.

At last I could see rails entering and leaving the nest, but I could not tell the male from the female. A rail would run to the nest, hesitate, and then leave. Was it the same bird or its mate? To find out I would have to capture and mark one of them. I borrowed a trap used for capturing nesting ducks and placed it on the nest. When I returned the rail was on the nest but the trap was still set. A three-ounce bird was not heavy enough to pull the pin from the trap door. I took the trap back and placed a mousetrap on the side, and sure enough, the rail set off the mousetrap which in turn pulled the pin, releasing the trap door and capturing the rail.

In order to tell the rails apart, I applied colored airplane dope to the feathers on the top of its head. I released the rail and was ready to begin data-yielding observation. First, the unmarked bird returned to the nest. It was replaced by the marked bird. Fine, I thought, now I'm getting somewhere. The next day the unmarked bird was on the nest. After a few hours

a second unmarked bird returned to the nest. What happened? I replaced the trap and caught the bird, which had but traces of paint on its feathers. Slowly I learned that rails allopreen, that is, they preen each other, particularly paint from head feathers. Eventually I marked the birds with circular pieces of colored plastic attached through their nasal openings with monofilament line.

Next I wanted to learn the size of the pair's territory. I asked the electronics engineer at our lab how small he could make a radio transmitter. He said, "Oh, about four ounces." That would have drowned the rail. Ah! I would use a bell. Everyone knows that rails bob their tails up and down. If I could put a bell on his tail, I could follow him through the marsh by sound. My first problem was to find a small bell such as a jingle bell. But in May storekeepers looked at me and said "You'll have to wait until November." Where would I get a bell? Finally I remembered: Mom's Christmas decorations! I took the smallest bell from the box in the attic. After capturing a rail, I tied the bell on its tail. The flexible tail feathers bent over in a "U" and the bird, flying away with the bell, never produced a single jingle.

I tried another tack. Borrowing a technique from mammalogy, I used a tracking board. This is a board covered with smoked kymograph paper and placed on the ground to see which animals walk across it. Unfortunately, I had no kymograph paper, so I went to the local butcher shop and asked for a piece of butcher paper. I returned to our cabin, lit the kerosene lantern, and adjusted it until it smoked heavily. Strands of soot began to hang from the ceiling, but the butcher paper remained snow white. This idea produced rather derogatory remarks from my co-workers. I abandoned it and tried using a board with a rag soaked with printer's ink on one side, and a strip of butcher paper on the other. Returning to the tracking board the next morning, I could see that a rail had walked across the inked rag and then the paper; however, the paper was covered with dew and showed no traces of ink.

The next year I returned with real kymograph paper, printer's ink, and permission from the U.S. Fish and Wildlife Service to toe-clip individual birds. I located a nest, captured a bird, and clipped one of its toes. I evenly spaced the tracking boards along the marsh on both sides of the nest. Now I would be able to see the footprints of the toe-clipped rail on the boards and tell how far from the nest the bird would go. The rail had other ideas. It returned to its nest, carried out its eggs, pierced them, and left the marsh.

Eventually I captured juvenile rails, sexed them by laporatomy, marked them, and placed them in a breeding pen. I planted cattails in the pen in rows that radiated from the blind so I could see the rails in between the rows. These birds provided the bulk of my thesis data. I usually observed the rails for the first four hours after dawn. One day my major professor asked me, "How do you know this is the most active time for the rails? I suggest you watch them for an entire 24-hour period." My observations went smoothly enough until dusk. After that I could only guess what was happening as I heard splashing in the night. Then one Friday night I got an idea from the same establishment that furnished me with the bar stool. I would use ultraviolet lights and mark the birds with fluorescent paint. The paint would need to last only one night. As the sun set I turned on the black light. The rails gave off eerie green, yellow, and orange glows. As one rail approached its mate on the nest, the mate shrieked, attacked it, and flew off. Perhaps the paint interfered with normal behavior.

Most of our field work was done in marshes near small towns. We were quickly identified as friendly and amusing strangers. At times, however, our research methods caused some of the locals to overcome their acceptance of science; they just had to ask us what we were doing. For example, one of my co-workers, Dave, made a habitat sketch of every nest he found. To do this, he had to carry a stepladder into the marsh. One day the mailman could stand it no longer. He stopped Dave and asked him just what he was doing with the ladder.

Another time I met three boys fishing just after I had left a tripod blind in the cattails. I probably did not appear to be a professional ornithologist since I had not shaved in a week and had waded in the muck in tennis shoes and shorts. Later one of their parents asked me if I had ever met that crazy man who lives in the tepee over the cattails. I had to admit that was me.

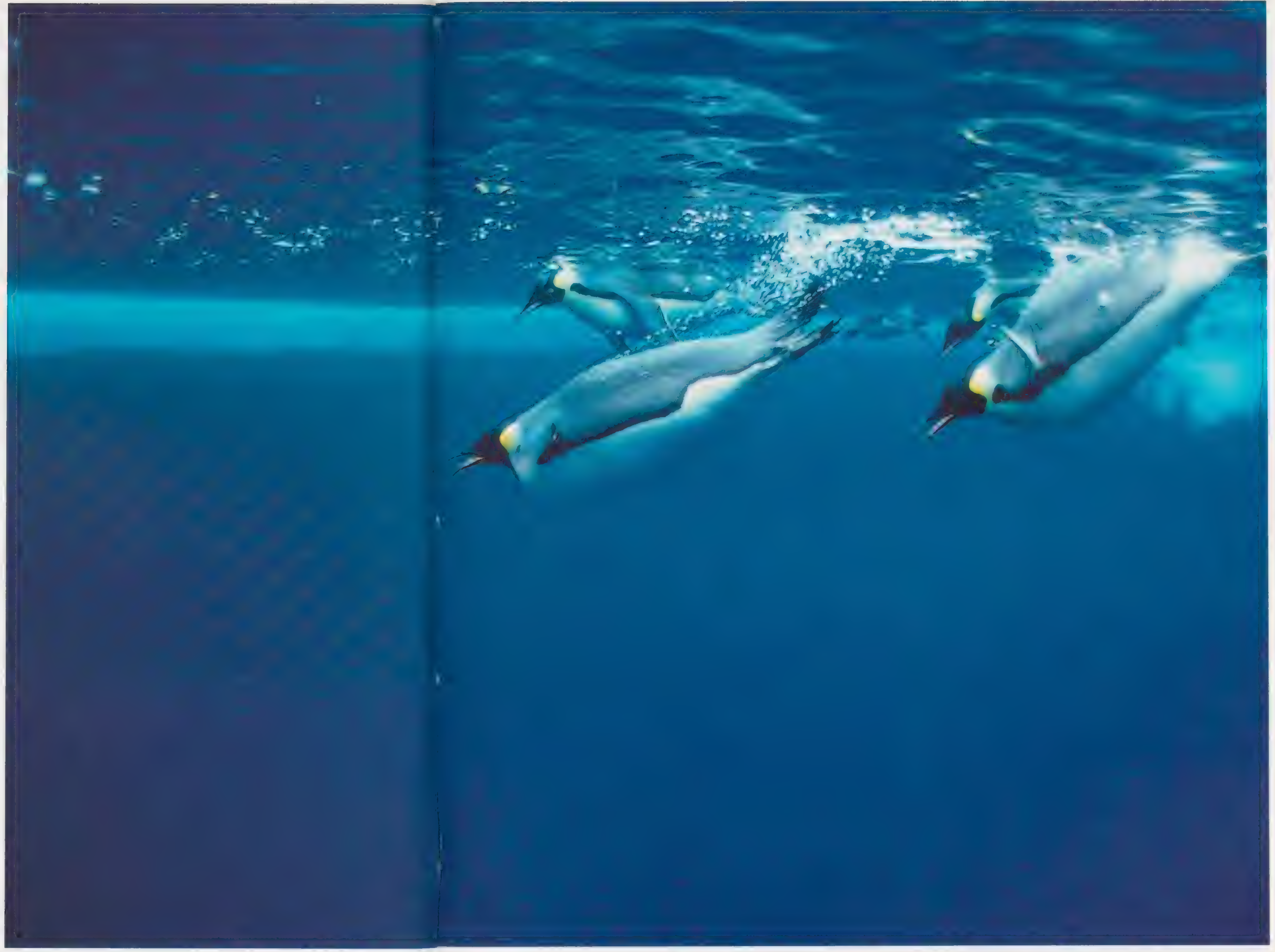
On second thought, scientific writing has its merits. Perhaps the methods section should be kept as is. □

Gerald Kaufmann is a professor of biology at Loras College, Dubuque, Iowa.

OBSERVING VISION: THE EYES HAVE IT

Jerry A. Waldvogel

MARY CLAY



WILLIAM CURTSINGER (PHOTO RESEARCHERS, INC.)

Birds' eyes are adapted to perform a wide range of visual tasks. The military macaw (far left) can rapidly adjust the size of its pupils to capture more light and obtain better focus on predators such as hawks or eagles. Emperor penguins (left) can dramatically alter the focal characteristics of their eyes so that they can see both above and below water.

Imagine that you are a summertime warbler, darting about in search of insects for a constantly hungry brood. Somehow you must find a seemingly endless quantity of insects, many of which are cryptically colored and hidden among tree branches or leaf litter. At the same time you must avoid becoming prey yourself—the ever-watchful sharp-shinned hawk perched nearby is also looking to feed its young.

Now picture yourself as the hawk, trying to detect the movements of a tiny yellowish warbler that is flitting about a background of mottled yellows, greens, and browns. Your target never remains stationary and occasionally seems to vanish altogether. Sound like a tough way to make a living? It would be for humans, but the adaptations in the eyes of birds provide them with solutions to many of the everyday problems encountered while foraging or avoiding predators.

To begin with, bird eyes are large. The eye of an ostrich, for example, measures nearly 2 inches in diameter and is the largest of any terrestrial vertebrate. Indeed, the eyes of most large birds, such as hawks and eagles, are larger than the human eye, which measures only about 1 inch in diameter. Bird eyes occupy a much larger percentage of the skull than do their human counterparts. Even in small songbirds, such as warblers and sparrows, the ratio of eye size to skull size far exceeds that of humans, reinforcing the notion that birds place a high degree of importance on obtaining visual information about the world around them.

Besides size, the placement of birds' eyes plays a significant role in effective vision. The American woodcock, for example, has eyes placed 180 degrees apart on opposite sides of its head, resulting in a 360-degree visual field. Such a dramatic spatial range of vision permits the bird, which is frequently the object of a predator's attention, to scan its entire surroundings instantaneously without the need for head movements that might alert a predator to its presence. Other birds, such as hawks and owls, have adapted differently. These hunters must judge depth of field precisely, therefore, they have frontally placed eyes with a high degree of overlap in the visual field of each. This means they have narrow visual fields and must move their heads from side to side in order to see 360 degrees.

Other adaptations in the avian eye include the optical resolution of the eye itself. Many species possess a high density of visually sensitive cells in the retina which allows a superb degree of visual acuity and motion sensitivity, thereby improving their ability to forage, avoid predators, and make the rapid adjustments necessary for aerial locomotion. For example, most diurnal raptors have a high density of cone cells in certain portions of their retina which permits the birds to get a precise picture of the world in much the same way a high-quality television set improves picture image by increasing the number of points that make up the screen.

Aquatic birds such as mergansers and penguins have the ability to alter the focus of their eyes in order to compensate for differences in the way that light travels through air versus water. This focusing feature permits these species to see both above and below the water's surface without the aid of a diver's face mask. Nocturnal species such as owls have night vision refined to the limits of physiological sensitivity, making them extremely accurate predators even on the darkest of nights.

The avian eye is a marvel of optical and neural engineering unparalleled among other vertebrates. These photographs illustrate a few of the special characteristics that make the avian eye such an evolutionarily successful sense organ. □

Jerry Waldvogel is a lecturer in biology at Cornell University. His research includes the mechanisms of polarized light vision in birds as well as the sensory basis of avian migration and navigation.

Further Reading

Erichsen, Jonathan T. "Vision." In *A Dictionary of Birds*, edited by B. Campbell and E. Lack. Buteo Books, Vermillion, South Dakota. 1985.

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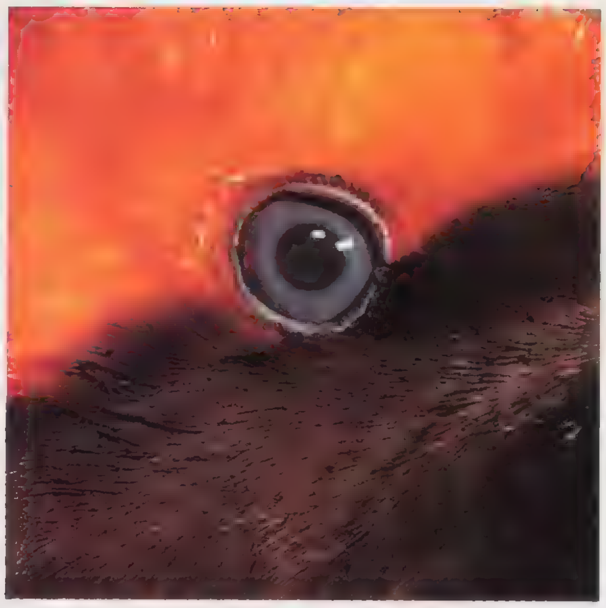
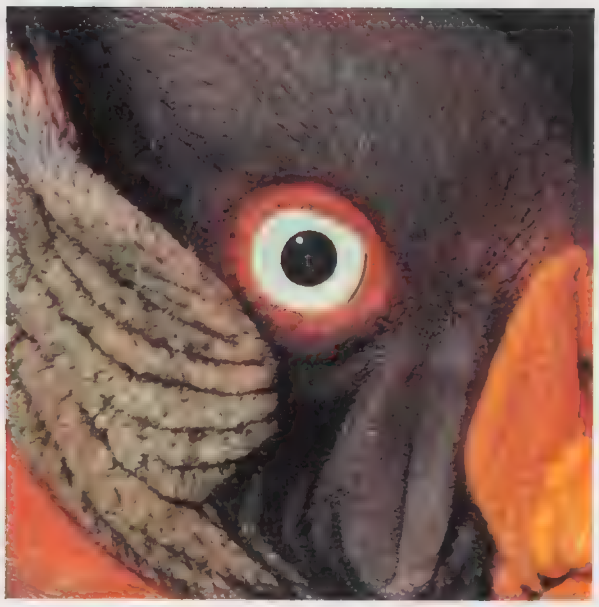
C. B. & D. W. Frith (Bruce Coleman Limited)



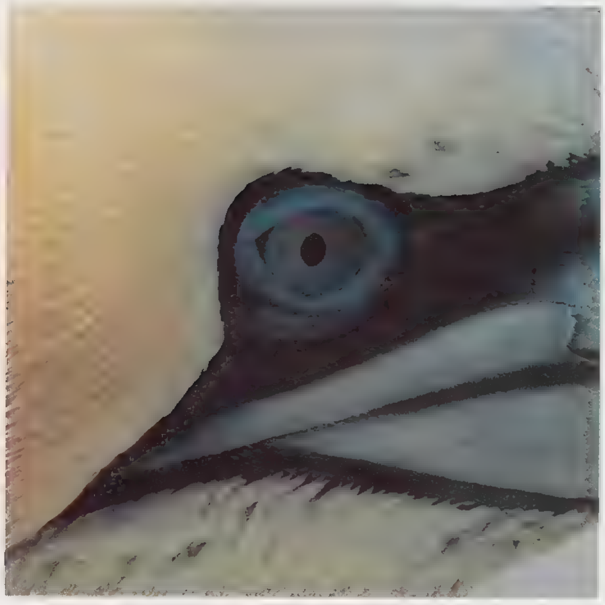
Crested bird of paradise

Rod Williams (Bruce Coleman Inc.)



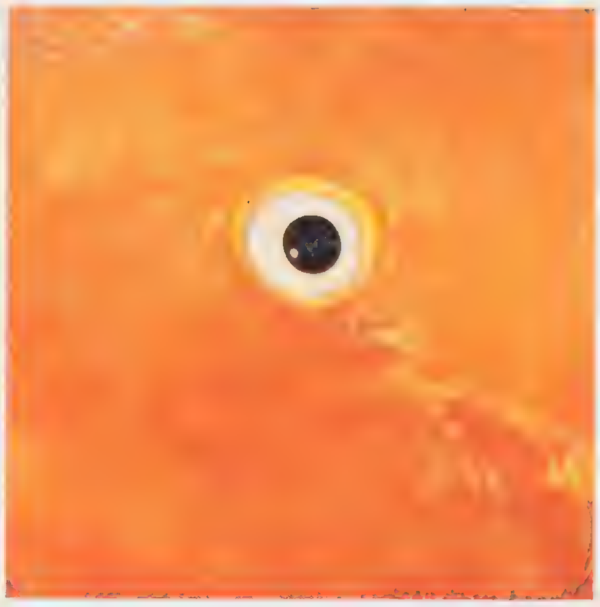
King vulture

A. Morris



Northern gannet

Kevin Schafer



Andean cock-of-the-rock

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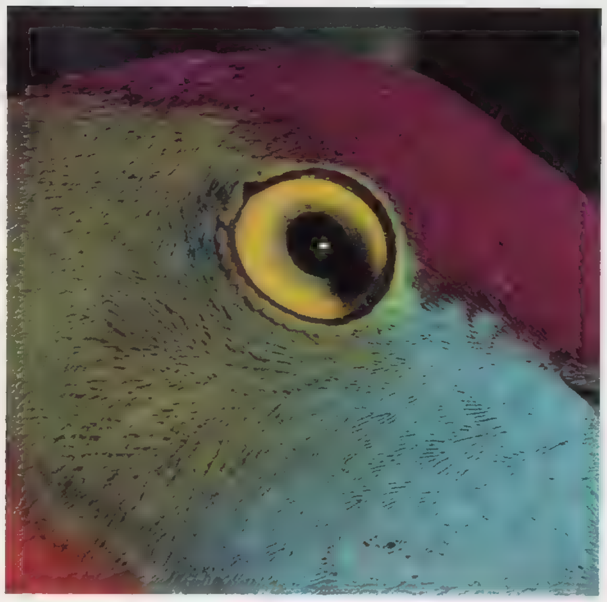
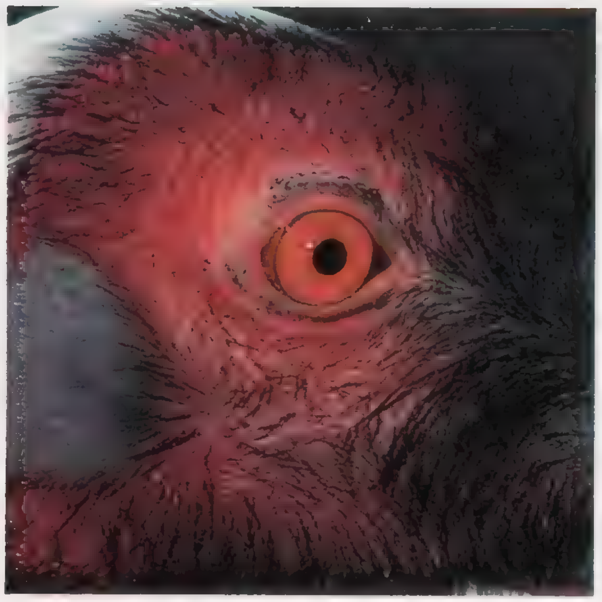


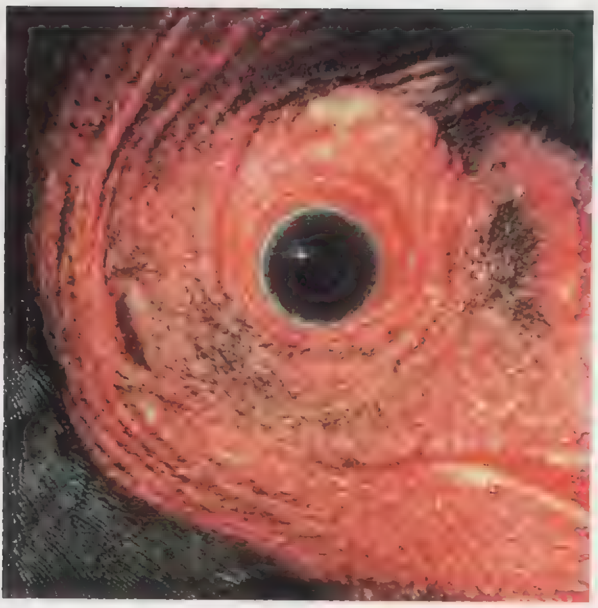
Superb fruit-dove

Mary Clay

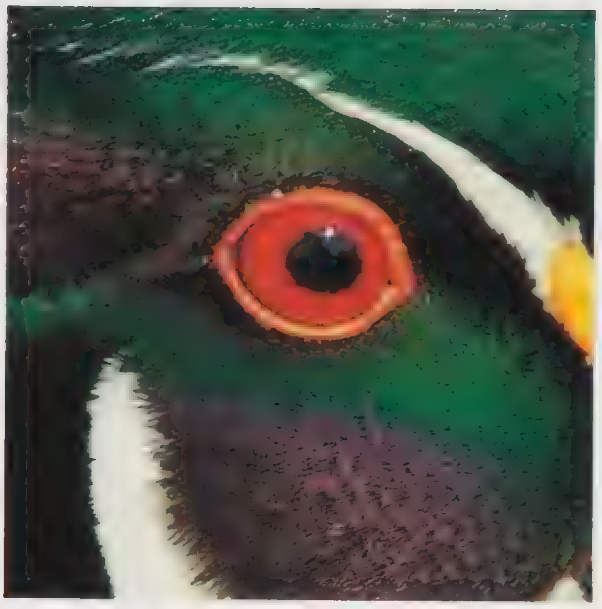


White-naped crane

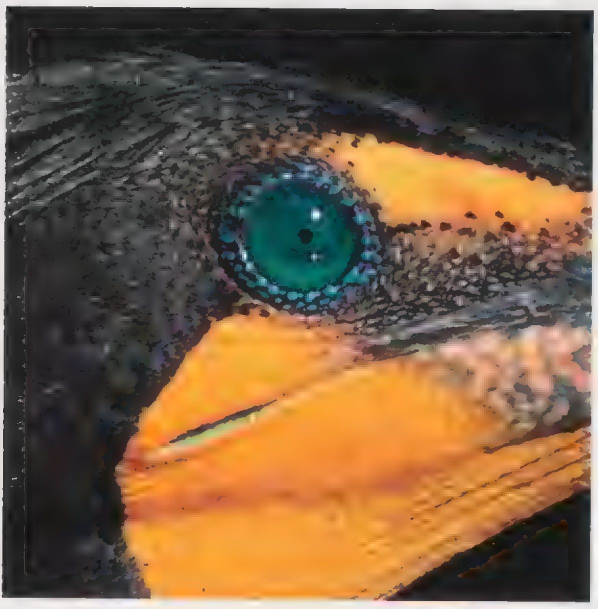
A rainbow of color exists in bird irises, the portion of the eye that surrounds the light-gathering pupil. Pigments, blood vessels, and structural elements produce iris colors, which range from dark brown to white. The exact function of iris color is not known, but in some species it may act as a signal of emotional state, sexual maturity, or breeding condition, while in others it probably serves to camouflage the eye and thus prevent detection by predators. It is certain, however, that iris color plays no essential role in vision, since the iris is opaque.


Marty Cordano

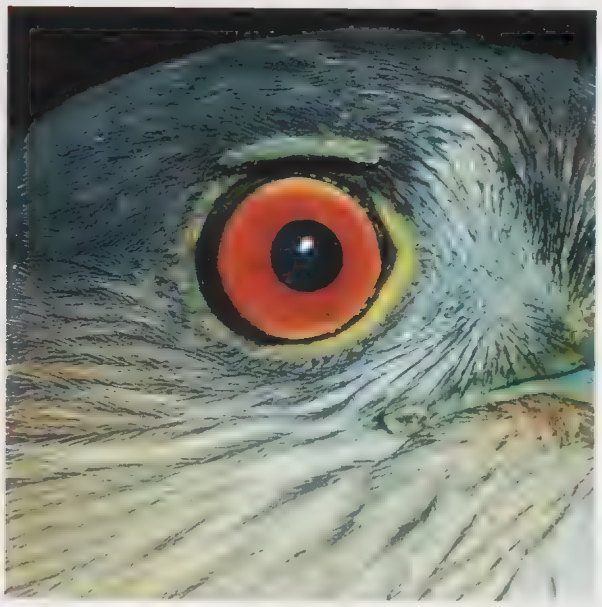
Turkey vulture


Rod Williams (Bruce Coleman Limited)

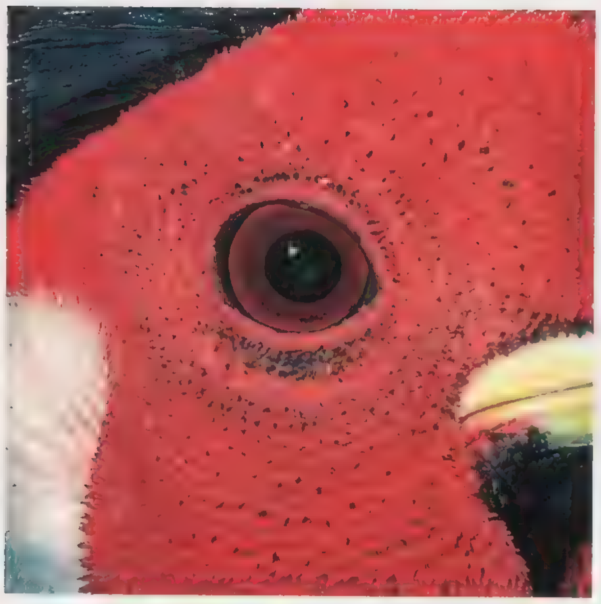
Wood duck


Robert Villani

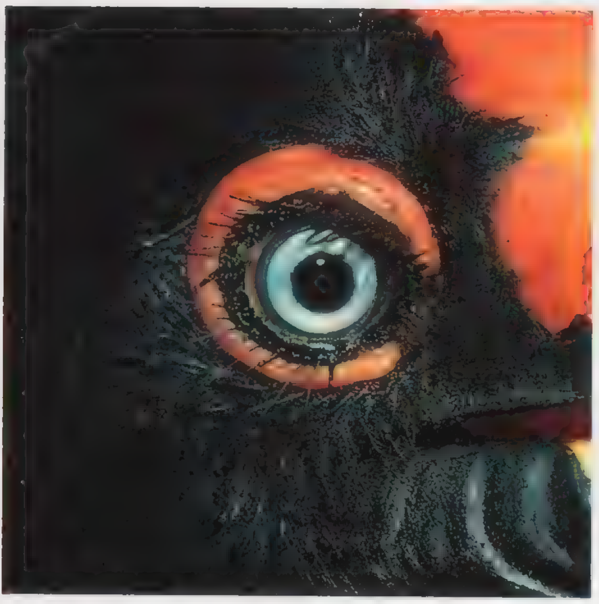
Double-crested cormorant


Robert P. Carr

Sharp-shinned hawk


Cristopher Crowley

Silver pheasant

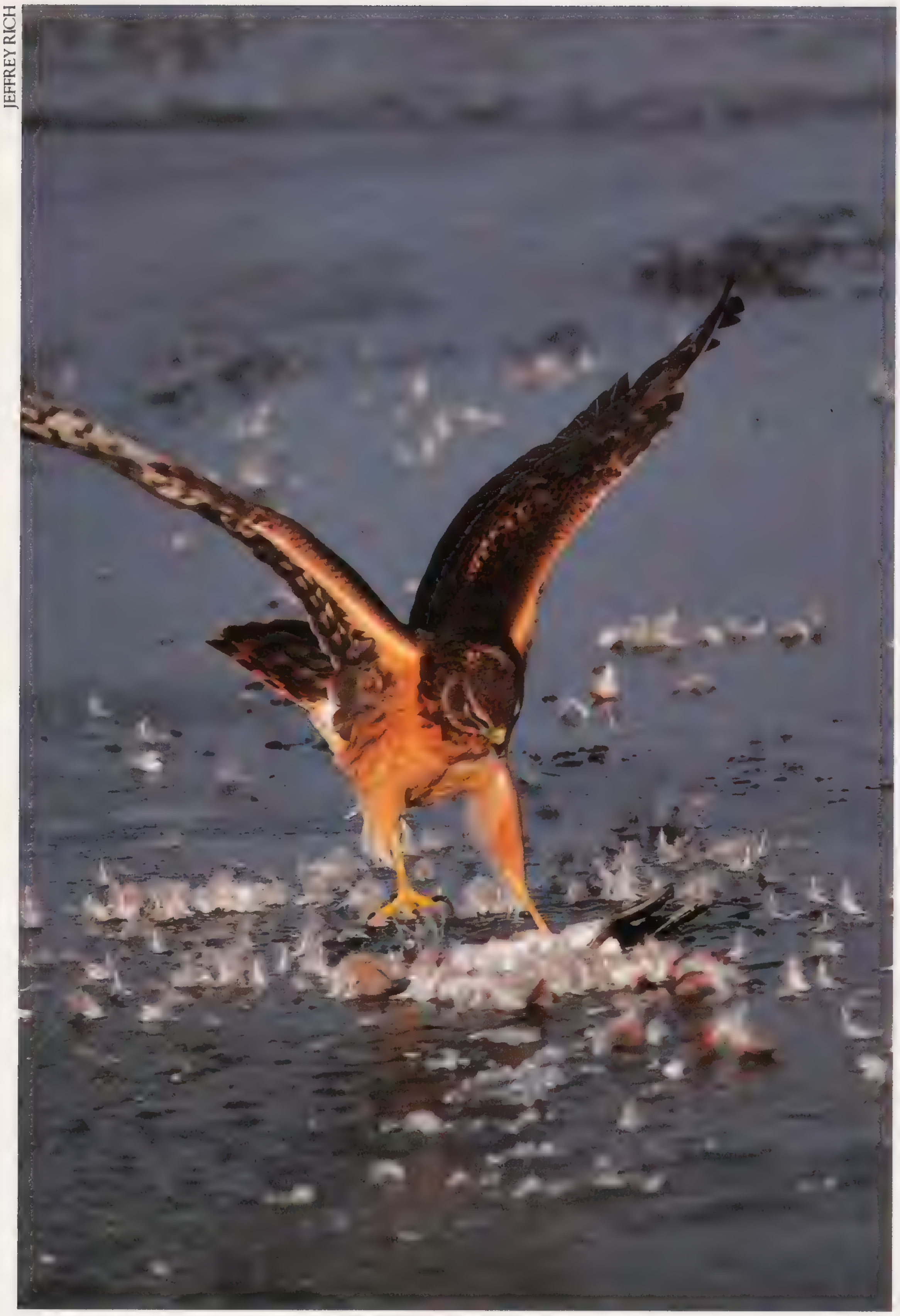

Sid Lipschutz (VIREO)

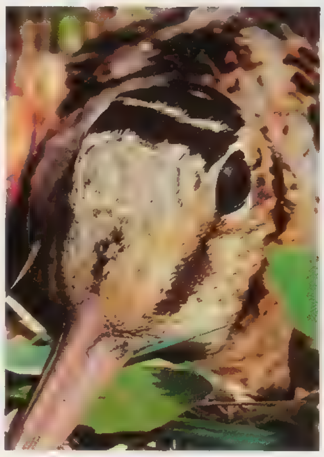
Rhinoceros hornbill

Night vision requires special adaptations. The great horned owl (far right) has extremely high-quality optics. Its eyes are large and tubular, and these characteristics increase the size of an image on the retina much the way a telephoto lens does on a camera. Another trick for capturing light at night is demonstrated by the "eyeshine" seen in an oilbird's eye (right). The red glow results from light bouncing off a reflective layer behind the retina which causes light to pass through the retina twice, thus improving its light-gathering ability.

SID LIPSCHUTZ (VIREO)

JEFFREY RICH

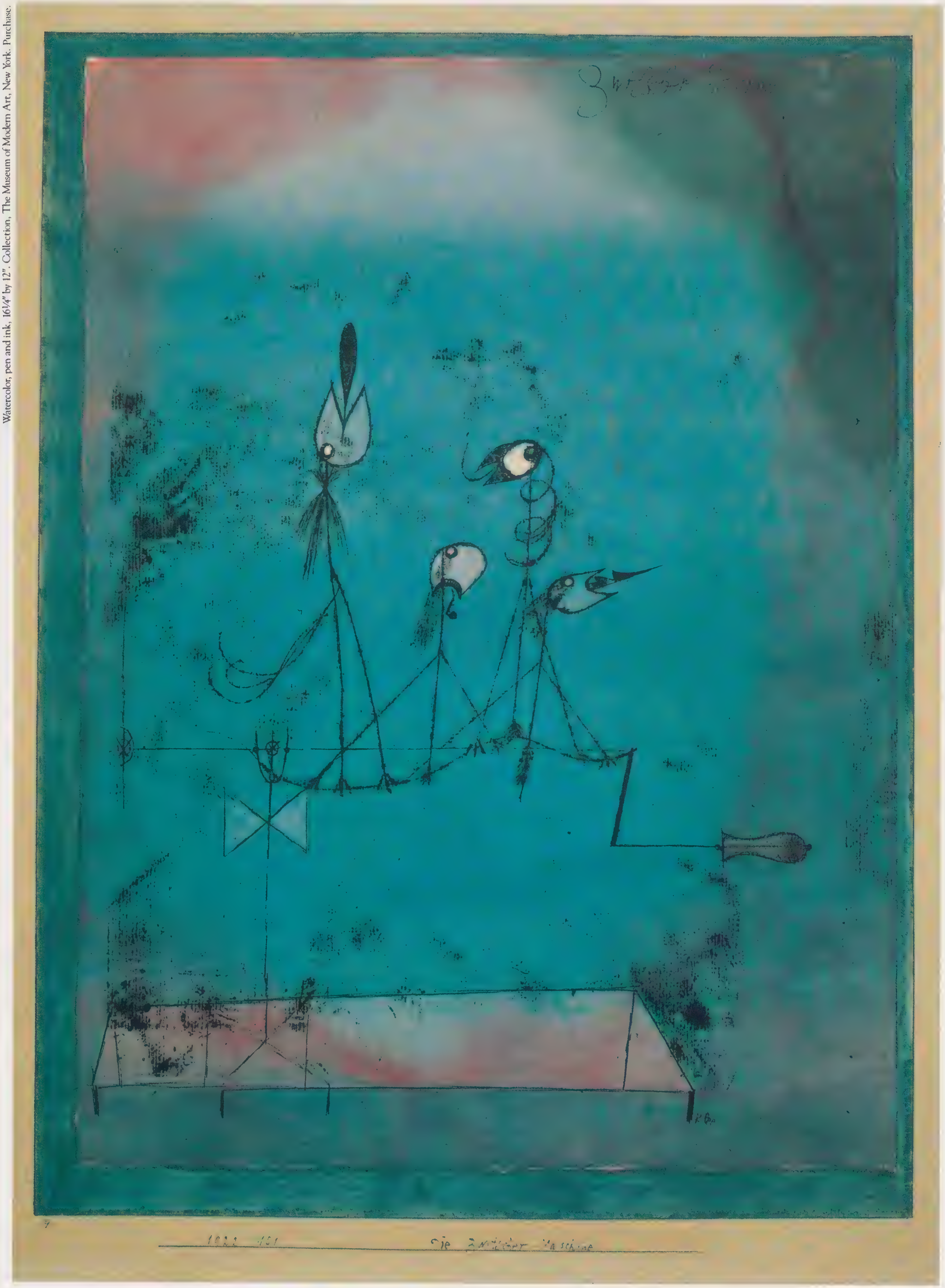




MICHEL BOURQUE (VALAN PHOTOS)

The way a bird sees the world varies with its needs. The American woodcock (above) must be ever-alert for predators. Its eyes, therefore, are located on opposite sides of the head and provide a wide visual field. This monocular view of the world sacrifices acuity and depth of field, but increases coverage. On the other hand, the northern harrier (left) and other birds of prey require binocular vision for hunting. Hawk eyes thus face forward, which improves depth of field but reduces the area viewed at any given instant.

JOE McDONALD


Zwitscher Maschine
1922 151
Die Zwitscher Maschine

Watercolor, pen and ink, 16¼" by 12". Collection, The Museum of Modern Art, New York. Purchase.

"Twittering Machine," 1922, by Paul Klee

DO BIRDS HAVE A MUSICAL SENSE?

Jeffery Boswall

Besides singing for survival reasons, do birds sing to satisfy their own aesthetic sense? As long ago as 1958 when most ethologists—scientists studying animal behavior—were pretty stuffy in their attitude toward animals having emotions, William H. Thorpe wrote, "The idea that bird song is often an expression of irrepressible joy can be supported with some plausible arguments, and is certainly not without some scientific justification. In so far as this may be true, the songs of birds can be regarded as a first step towards true artistic creation and expression." There is a simple choice: either aesthetics is confined to one species, *Homo sapiens*, or it isn't. Since evolution is a gradual process, and since the animals have anticipated so much that is human, it is certainly a valid issue to raise. However, it is also true that much is uniquely human.

But why shouldn't bird song give "personal satisfaction" to the singer? Could not the poets and the scientists both be right? Nowadays there are comparatively few scientists who will not agree that birds may have a sense of musical beauty, that they may sing not only because it is beautiful but because they find it individually rewarding.

A number of reasons support this idea. In their songs many, many birds use distinctly complex musical phrases, whereas to be utilitarian—merely functional—it seems fair to suppose that ordinary noises in quite short, repeated bursts would do the job. Secondly, birds employ musical devices just as human composers do: *accelerando* and *ritardando*, *crescendo* and *diminuendo*. Some researchers hold that this indicates the satisfaction of a musical sense. Most convincing of all perhaps is the observable fact that long after certain birds like blackbirds and willow warblers have secured a mate and firmly established a territory, the males continue to develop their songs musically. To say the least, it is no easier to find a function for them doing this than to suppose that the song is developed for its own sake.

I will end with a truly striking example of avian musical composition. In Bavaria, a crested lark *Galerida cristata* imitated the four whistled commands a shepherd used to work his dog. The sounds were picked up and used by the bird, not by weaving them among his own notes but by using them together. The bird—and I quote directly from Professor Erwin Tretzel's paper—"employed fairly accurately the intervals of the scale of C major" and "presented its shepherd imitations mostly in a pleasing arrangement with definite metrical construction that revealed an astonishing sense of feel of the singer for musical form and proportion."

From "The Language of Birds," 1983. Royal Institution Proceedings 55:249–303. By courtesy of the director of The Royal Institution.

WHERE MAN AND BIRD MEET

Marcia Bliss Marks and Tang Xiyang

GEORGE ARCHIBALD (INTERNATIONAL CRANE FOUNDATION)

Caohai Nature Reserve, Guizhou Province, China, is an important winter home to the rare black-necked crane. Nowhere else in the country can one so closely approach the birds, which seem to know, probably from the clothes, who belongs in the area and who doesn't. Unfortunately, Caohai is threatened by local farmers who would drain the region to grow crops.

To eat only potatoes and buckwheat, to eat corn only when a wife gives birth, to eat rice only after death.

This had been said through the ages of the inhabitants of Weining County in Guizhou Province, one of the poorest provinces in China. So poor were its people that at one time they drained Caohai (Grass Lake) and tried to grow rice on the exposed land. Little did it matter to them that the lake was the winter home of the rare black-necked crane. The people needed to fill their stomachs and Caohai represented the only land available for farming.

Caohai is located in the southwestern part of Weining Autonomous County in western Guizhou. The county is a land- and water-poor area with an ever-increasing population. Although Caohai was established as a 13,300-acre nature reserve under China's Bureau of Environmental Protection in 1985, it remains under constant pressure. To many local officials the people's livelihood is of utmost importance, and the birds, including 16 species under state protection, are of little consequence. We had heard that these officials were at loggerheads with naturalists over whether to drain the lake again and grow crops or leave it as the cranes' winter habitat, so we decided to investigate.

At Caohai, as dawn tints the hills crimson and the moon sinks slowly behind them, comes the morning's first bird call. It breaks the silence of night with an urgency that other birds heed, and soon the skies are alive with sound and flight. The clear, harsh call of the cranes is the first sound, rousing the geese and ducks; then, arrowlike, line after line takes off, silhouetted in the half light, circling the marshland before settling down to feed, the ducks' wings presto to the cranes' legato.

Full light reveals farmers working the fields while pigs, sheep, water buffalo, and cranes, sometimes a dog or two, graze in their midst. It's the Peaceable Kingdom come true—man, beast, and bird commingling. Or so it would seem. But underlying this apparent harmony is a history of conflict and confusion that remains unresolved.

Caohai, a karst (corroded-rock) lake in high plateau country, is 7,160 feet above sea level. It has become known far beyond provincial and national boundaries because of its most illustrious resident, the black-necked crane. Common cranes and hooded cranes also winter there, and as rare birds, all are under state protection. Only one other reserve in China specifically protects black-necked cranes—Longboatan in Qinghai Province—but at 13,900 feet above sea level it is difficult to reach.

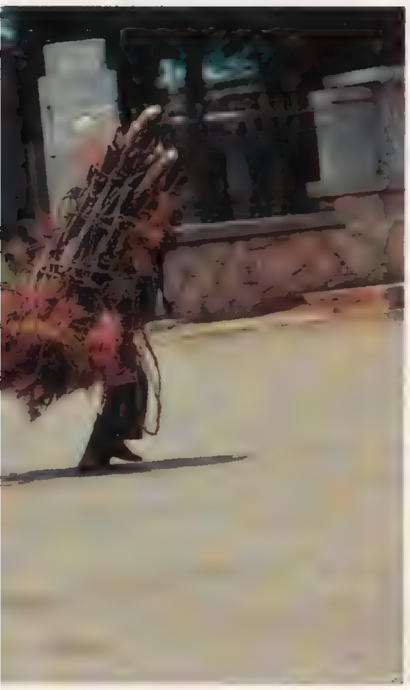
Nowhere in China can one approach the cranes so closely as at Caohai. The black-necked cranes particularly seem not to fear humans, always taking flight later than the common cranes when strangers approach. They somehow know, probably from the clothes, who belongs in the area and who doesn't. The common cranes are, nevertheless, far more numerous, two thousand compared to two hundred black-necked cranes.

Caohai's checkered past and uncertain future are the past and future of the cranes' habitat as well. At one point, when Caohai was drained to provide cropland, the birds disappeared; only recently, with a change in outlook and policy, have they returned.

To understand the current controversy it might help to look at the recent past. The excesses of China's "cultural revolution"—the 10 years between 1966 and 1976 when China underwent economic, political, and social upheaval—play a significant part, but the basic factors are a people too poor to feed themselves and the desperate, often ignorant, search for the means to do so.

Local farmers first wanted to drain Caohai in the early 1950s, but a soil expert from the Soviet Union opposed the plan, saying the area was not suitable for cropland. Thus the lake was not touched and the people remained poor.

At that time Weining County had a 35 percent forest cover. Some of the local inhabitants still remember the enormous trees and wild animals. Leopards and tigers would wander into town. Then, in 1958, during the Great Leap Forward—a movement aimed at transforming China from a backward agricultural country to a modern, industrialized nation—trees were felled to supply the many iron and steel works that sprang up everywhere. In the 1960s more trees



DELTA WILLIS (BRUCE COLEMAN INC.)

were cut to build the Guiyang-Kunming Railroad. A lot of wood was cut and wasted because there was no way to transport it.

Then in the 1970s the idea of draining Caohai raised its head again. This time it won support. In 1971–72 eight thousand people spent winter and spring digging a ditch to drain off all the water. Such high land is normally considered unsuitable for rice cultivation, but the local committee of workers declared that because the land was high, it was closer to the sun and thus capable of producing three times the normal yield. There was a plan as well for Weining to become the largest grower of sugar beets in Guizhou. Many of the more educated residents opposed the plans, considering them as likely to succeed as "pigs wearing gold earrings," but they kept silent.

As it turned out, only a small area—one-tenth of that planned—could be used for growing crops; in the middle were rock and marsh. Rain washed out the grain, then in 1978 there was a serious drought, in 1980 a late frost. Underground water was bad. Insects and rats seriously damaged the crops. Deforestation continued, the peasants cutting trees to sell. The ecological balance of the area was destroyed. The climate changed to dry springs, cool summers, and rainy falls, with hail, frost, and double tornadoes. People fell sick. The land, of no use for farming, became a test site for weapons.

In 1980 Qin Tianzhen, then deputy governor of Guizhou Province, took many scientists to Weining to investigate the situation. They decided that the lake should be restored. The local inhabitants were unhappy about losing their land, but they knew that their crops were of poor quality, and they realized that things were not good: no fish, no birds, bad weather, people sick. A low dam—all the area could afford—was built. Water reflooded to cover 10 square miles (in earlier times it had covered 18 square miles). Grass grew quickly. Fish and birds returned. Yet old ideas die hard. Before long the farmers had dug a ditch around the dam to drain water for irrigation, reducing the water area to less than 8 square miles.

Caohai's quick recovery, however, showed its vitality. It seemed to turn green overnight and was soon yielding hundreds of tons of small fish. Since it was made a nature reserve in 1985, however, fishing has been forbidden in winter when migratory birds return and also in spring when fish breed.

What about the future of Caohai? Many problems remain unresolved. Bureau of Environmental Protection plans for the next stage of rehabilitation may increase the water cover to 12 square miles—perhaps too much for waders like the cranes. Yet in the 1950s the water reached such a level and the birds thrived. Some people say the situation is different now—more people, more economic activity, more houses. The cranes may be squeezed between water and people. Others counter by saying a dam can keep the water at a comfortable level for the cranes throughout the year. Another problem is disease. Some cranes have died from an illness caught from infected chickens. Too much contact between domestic birds and wild birds poses a danger, particularly given the numbers of domestic ducks and geese on the lake.

Trees are as important as water. To keep Caohai healthy it must have trees around its basin. Weining now has only a 7 percent forest cover. The Forestry Bureau encourages peasants to grow trees, and every year enough are planted to cover Weining three times over, but most die from lack of attention and care. It will take a hundred years to regain the forest cover of the 1950s.

GEORGE ARCHIBALD (INTERNATIONAL CRANE FOUNDATION) (2)

The problem at Caohai is a people too poor to feed themselves and their desperate search for a means to do so. When basic needs like food and fuelwood compete with bird habitat it's the birds that usually lose. Ironically, the land at Caohai is largely unsuitable for farming.

PEN KUANG

GEORGE ARCHIBALD (INTERNATIONAL CRANE FOUNDATION) (2)

Fortunately for the birds, scientists began studying Caohai in 1980 and recommended that it be preserved. Still, its future remains uncertain. How can the government protect the area yet provide for the people's livelihood? In the balance lies not only the black-necked crane but numerous other birds including the common crane (right) and ruddy shelduck (left).

In March 1986 the provincial government held a meeting at Caohai to discuss its development and use, and in December of that year reports on a scientific survey of Caohai, conducted by the Institute of Biology, Guizhou Academy of Sciences, were published, but the issue remains: how to protect the area yet provide for the people's livelihood. Recent natural disasters and extreme climatic changes were taken by the local inhabitants as nature's punishment for meddling with the environment. Scientists oppose comprehensive development. Can the people raise fish, process meat (Weining is famous for its hams), grow pears and walnuts? Should the people move elsewhere? If so, where? Can their stomachs understand that if it weren't for the black-necked cranes, no one—not the provincial government, the central government, or the scientists from the International Crane Foundation studying the birds—would pay Caohai much heed?

Because of Guizhou's many karst formations, the province has few wetlands, so birds flock to Caohai as an oasis. The Institute of Biology survey showed 110 species of birds, 56 of them breeding birds (43 resident and 13 summer migratory birds). Caohai's water is unpolluted and supports numerous aquatic organisms: fish, plants, and invertebrates. The cranes feed mostly on plants and spend the winter at Caohai. They alone could make Weining famous and bring in tourist dollars, yet an influx of bird watchers would also put additional pressure on the small area.

Caohai Nature Reserve is unusually close to houses, farmland, and economic activity. Its problems are perhaps more complex than those of Guizhou's other nature reserves, yet all suffer from the same conflict. Designation as a reserve is like an open sesame for the development of tourism.

From Caohai we went to Suoluo Nature Reserve, named for its star tenant, the spinulose tree fern. Our hearts sank as administrative personnel told us of plans for guesthouses, a lake for boating, calligraphy to be carved into rock faces (a Chinese custom), and who knows what else. As we tramped over trails past waterfalls, red rock, and flowering trees, stopping to look at the tree fern with its pulpy, furry wood and umbrella-shaped branches, we realized we were viewing some of the most natural, untouched scenery we'd seen in China—not a pavilion in sight, no inscriptions on the rocks, not even the endless stairs one finds on the tallest mountains—and no litter, a monstrous problem elsewhere in China. The few houses were mud and bamboo, blending into the background. The sound of falling water followed us everywhere, and birds circled the slopes or darted over the pristine stream.

The second day we went to the high slopes to see stands of bamboo, Suoluo's major industrial product. Even here the commercial activity was unintrusive and the many types and uses of bamboo were impressive. Suoluo is a new reserve and not as accessible as some others. It has a chance to survive intact if the ambitious plans to attract tourists are kept to a minimum.

As for Caohai, little of nature is left, yet what is there is crucial to thousands of birds—not just the cranes, but gray herons, bar-headed geese, ruddy shelducks, common black-headed gulls, peregrine falcons, and many others. Somehow humans and birds must find a common ground. Who knows—miracles can happen, even in China. Particularly in China. □

Marcia Marks is a senior editor in the English department at Foreign Languages Press in Beijing. Tang Xiyang is editor-in-chief of China's *Nature* magazine and author of *Living Treasures, an Odyssey Through China's Extraordinary Nature Reserves.*

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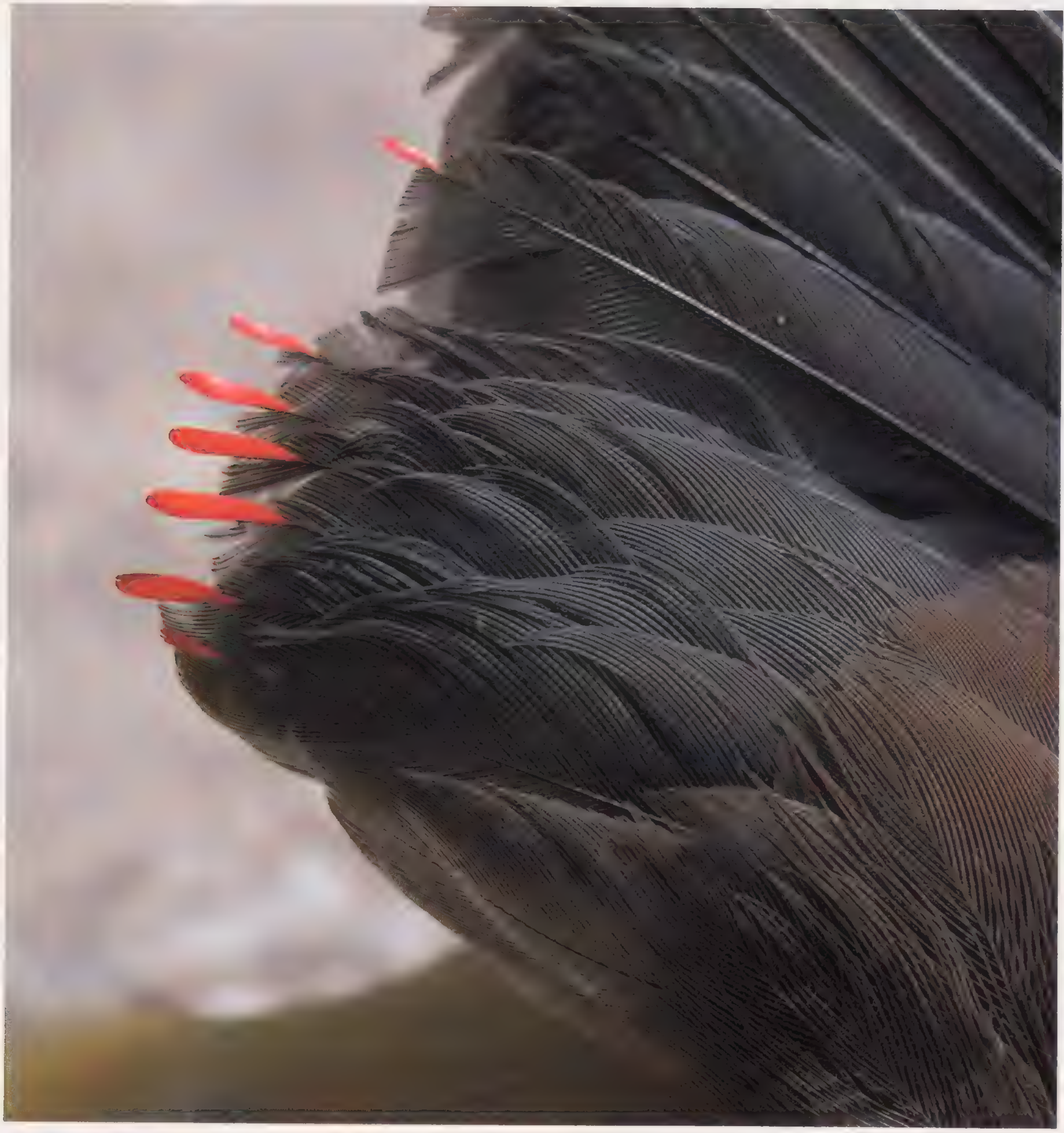
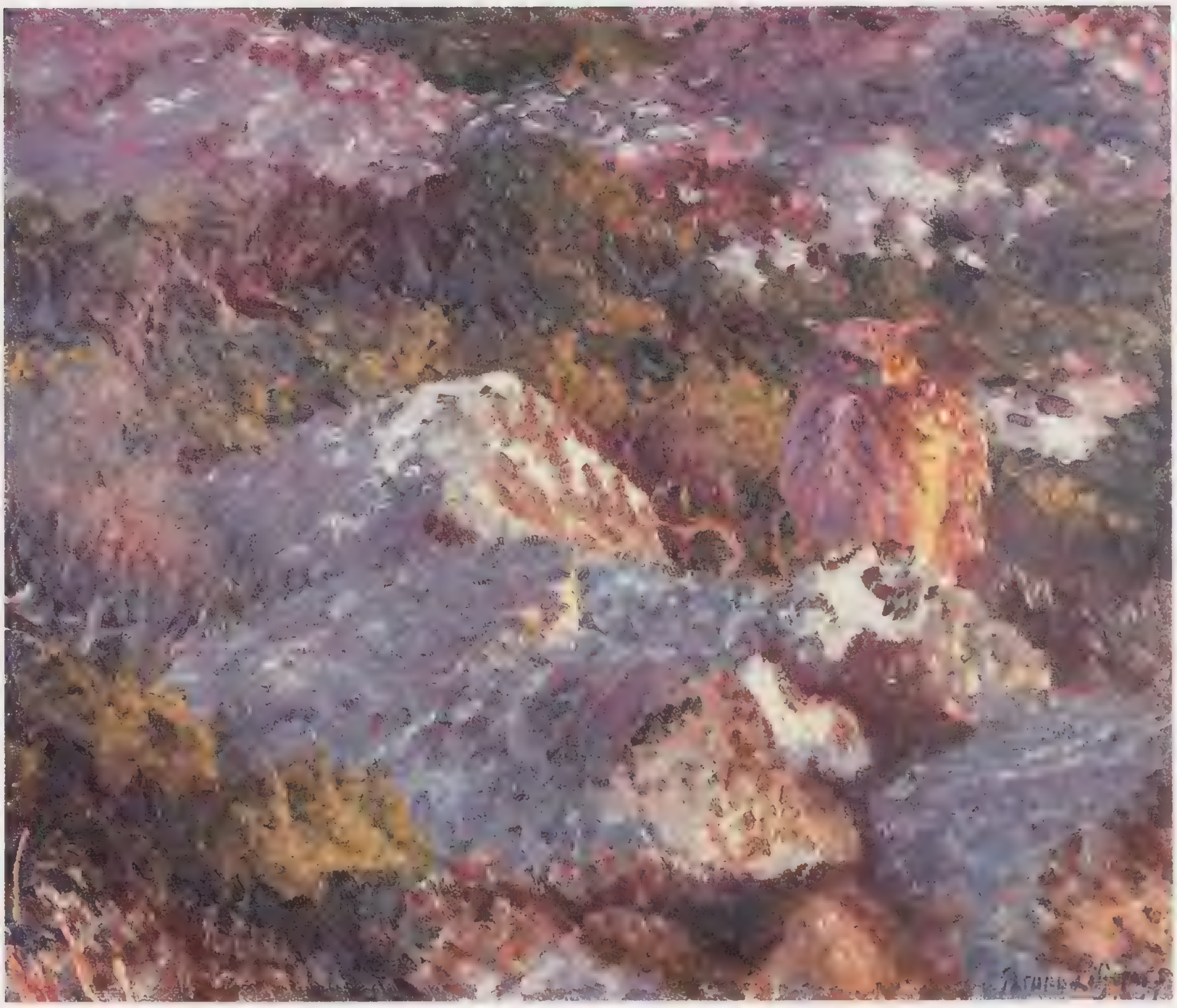


GRANT HEILMAN PHOTOGRAPHY

You have probably never looked this closely at the tips of a cedar waxwing's secondary flight feathers, but if you did, you'd quickly realize where the bird gets its name. The red (sometimes yellow) globules are not wax, however, but waxlike deposits of pigment that grow out of the feather shafts and are shared only by the closely related Bohemian and Japanese waxwings. Sometimes the bulbous structures are also found on the tail. What's their purpose? No one knows. Some individuals lack them altogether, and on those birds that do have them, they are not correlated with age, sex, or season. Perhaps, like conspicuous color markings on other species, the waxlike structures distract the attention of would-be predators.



"Eagle Owl on Rock," 1916, by Bruno Liljefors

BRUNO LILJEFORS: THE PEERLESS EYE by Martha Hill. 1987. Doubleday & Company, Inc., Garden City, New York. 105 colorplates, 56 halftones. 11¼" x 12", 174 pages. $60.00 (cloth).

This attractively designed book provides a long overdue and generous sampling of paintings by the great Swedish artist Bruno Liljefors (1860–1939), as well as a perceptive sketch of his life and the aesthetic milieu of his times. His life was his work but no gold mine for the biographer. What comes through in these pages is the portrait of a good solid burgher without a trace of eccentricity or flamboyance, a man not given to adventure or travel. Except for a period of study in Germany in his youth and a much later return visit for medical treatment, it appears he journeyed only to France and Denmark. Yet his stay in Copenhagen may have marked the most dramatic incident of his life.

In 1879, when he was 19, Liljefors painted an oil portrait of an eight-year-old girl, Signe Olofsson, which gained him entry to the Royal Academy of Fine Arts in Stockholm. Eight years later he married her older sister Anna, but after seven years of marriage and three children, they were divorced. The Danish sojourn was required to prove abandonment in the proceedings. Liljefors then married Signe. The author rather glosses over this event, but it must have caused one hell of a scandal in those days. Bruno called the eight children of the new union his "second litter." The family moved from time to time, always to places that gave the artist new scenes to paint and allowed him to pursue his penchant for hunting.

The Peerless Eye tells us quite a bit about the artist's working methods, his strong preference for outdoor painting in every kind of weather or, if in the studio, in one so near the scene that it was virtually a blind.

The book also discusses Liljefors's style and shows examples. At first his work was heavily influenced by what might be called German Realism—detailed, crisp, hard edged and rather flat. It sometimes inclined toward the Japanesque, for example, "Hawk and Blackgame" and "Wagtails." This decorative period, a sort of innocent Darwinism with an overglaze of charm, rapidly metamorphosed in the late 1880s. By the turn of the century his mature style had emerged full blown, and during the enormously productive 15 years that followed, he did most of his finest work. The influence now was clearly French Impressionism; the linear edge was abandoned in favor of light and atmosphere.

What a marvel that those slashing attacks on the canvas could so powerfully and economically convey the full dynamics of nature in such controlled space! Nature was his stage—scrubby woodlands, grassy meadows and marshes, rocky coasts, and skerries in the open Baltic. A select company of animals were his ensemble players—eagles attacking hares, hares fleeing foxes, foxes chased by hounds, hunters stalking foxes, eagles killing eiders, crows mobbing hawks, and other variations on his theme, the hunt.

A concurrent secondary motif, which I prefer, discards the dramatics to depict these same creatures going quietly and deliberately about their lives—a snipe feeding at water's edge, a curlew standing alert in the grass, a grebe bobbing in sea wrack—studies in camouflage.

Of course the real subject matter, as in all art, is feeling. The objective subject may be very important in motivating the artist or in the associations, interests, and experiences the viewer brings to it, but it has little to do with art except as a frame of reference, a locus of interest. Take, for instance, Claude Monet's many paintings of haystacks, facades of the Rouen Cathedral, or of water lilies at Giverny. Surely it is not the subjects themselves that make such a deep impression, but rather what is done with them.

I am obliged to make a few criticisms about the plates and their captions. The painting on page 121 depicts black-backed, not herring gulls. And it is not a cornfield the cat on page 28 is sitting in. Timothy perhaps? "Eiders and Surf" is captioned c. 1930 but clearly signed 1919. Sizes of all the originals should have been given, and in inches rather than centimeters, so that the degree of reduction could be gauged. The positioning of the paintings on page 80 and pages 154–55 with the birds' bills in the gutter is unfortunate and unnecessary. Plate registration is good but the color fidelity varies wildly, often unpardonably for a book at this price. The printer should sack whoever permitted the "Hooded Crows" to lose all its grays and greens, or the "Blackgame Displaying in Marsh" to go entirely red. The latter painting has had almost half its picture area cropped from the left and across the top, and one bird completely excised in the process. Yet it is not labeled as a detail. Other paintings are off-color too, usually on the pink side. I would have preferred not having the small sketches and paintings reproduced so large and the space saved used for some fine paintings not included. The plates are presented helter-skelter without regard to period, subject, or style. Nevertheless, on balance this is a very worthwhile book and should be studied by all the present-day wildlife artists who think that photographs can substitute for field work.

—Don R. Eckelberry

An exhibition of nearly 50 Liljefors paintings opened at the American Museum of Natural History in New York City April 15 and will run until August 7. In Minneapolis the exhibition will be on display at the James Ford Bell Museum of Natural History from September 9 to December 31.

THE BIRDS OF CHINA by Rodolphe Meyer de Schauensee. 1984. Smithsonian Institution Press, Washington, D.C. Colorplates and black-and-white drawings. 602 pages. $29.95 (paper).

I was pleasantly surprised to see the new field guide by Rodolphe Meyer de Schauensee, *The Birds of China.* Dr. de Schauensee roams the broad range of Chinese ornithology with so much data and assurance that I can hardly believe the book was not written by a Chinese ornithologist. So far as I know, this is the first volume in English to contain such substantial information about Chinese birds.

Because of its great depth and breadth, the book is ideal for the touring bird watcher. It offers a checklist of every species of bird in China, Taiwan, and Hong Kong, and information on diagnostic field marks, ecology and taxonomy, and the range for each species.

In this last respect the book is particularly valuable: If you know nothing about the geography or natural history of this vast country, it can be difficult to find the birds you're looking for. The book helps readers overcome this problem by including an extensive history, a geographical section, physical features, and detailed maps. Dr. de Schauensee has been meticulous in his writing and arrangement of this precious background material, which is seldom described in similar books, even those published in China.

In addition to a wealth of written data, the book includes outstanding art. Readers will be charmed by the 38 fine colorplates and 39 remarkably vivid wash drawings of typical Chinese birds in their habitats, some drawn by well-known artists. Because of this distinguishing feature, the work is highly useful to the amateur bird watcher; and as for the professionals, it follows the Chinese saying: adding flowers to the brocade.

We Chinese ornithologists can learn from the strong points of American ornithologist de Schauensee. I recommend this masterpiece on China's birds to amateur bird watchers and ornithologists from every country. I'm sure it will guide them through China with great success.

—Zhang Zhi-yen

BIRDERS' BUDDY, specialized birding vest.

The name may be corny but the product is great. I took one of these vests on a recent birding trip to Ecuador and found it indispensable. The huge front pockets swallowed my two-pound field guide, tape recorder, and field notebook. The small breast pockets held film, pen, sunglasses, and lens caps safely under velcro-fitted flaps. And the monstrous pocket on the back served as a built-in backpack, in which I stuffed a sweater, rain jacket, and several stale croissants. Result—all the gear I needed was easily stowed within quick reach, and my hands were free to operate binoculars and camera.

What's more, this is an all-weather vest. In the hot and humid rainforest, where I wore it over a T-shirt, the open sides provided ventilation. Yet, after some simple adjustments to the side straps, the vest fit easily over the wool jacket I wore on the cool slopes of the Andes.

The product is also of high quality. It's constructed of durable, desert-tan poplin, with heavy stitching and rugged plastic buckles and latches. The vest I used had been heavily tested before I received it, yet showed no signs of wear.

My only complaint: I had to send the vest back when my trip was over.

"Birders' Buddy" is available in two sizes, S-M and L-XL. You can order one for $55 (plus $3 for postage and handling) from Birders' Buddy, 330 S. Ash Lane, Flagstaff, Arizona 86004. (602)526–4864. *—R. E. Bonney, Jr.*

The Joy of Context

Listkeeping has a shady reputation in certain birding circles, and I think I know why.

Frustration, envy, and the stuck-at-home blues.

Almost all birders I know, listers and non, have less time for birding than they wish they had. It's a simple fact of life that jobs, families, and other intrusions from the "real world" limit the time available for standing around with binoculars held up to your eyes. Unfortunately, some birders saddled with good jobs or loving families—or the terrible, double-whammy handicap of a good job *and* a loving family—need to vent their frustration somewhere.

A typical sequence goes like this:

Birder A, having just returned from a three-hour ride to the coast to add Barrow's goldeneye to his year list, brags about his successful trip to birders B and C. B and C wait until he walks away, then commiserate.

B: Can you believe that? Three hours each way to see one bird.

C: I gave up listkeeping years ago.

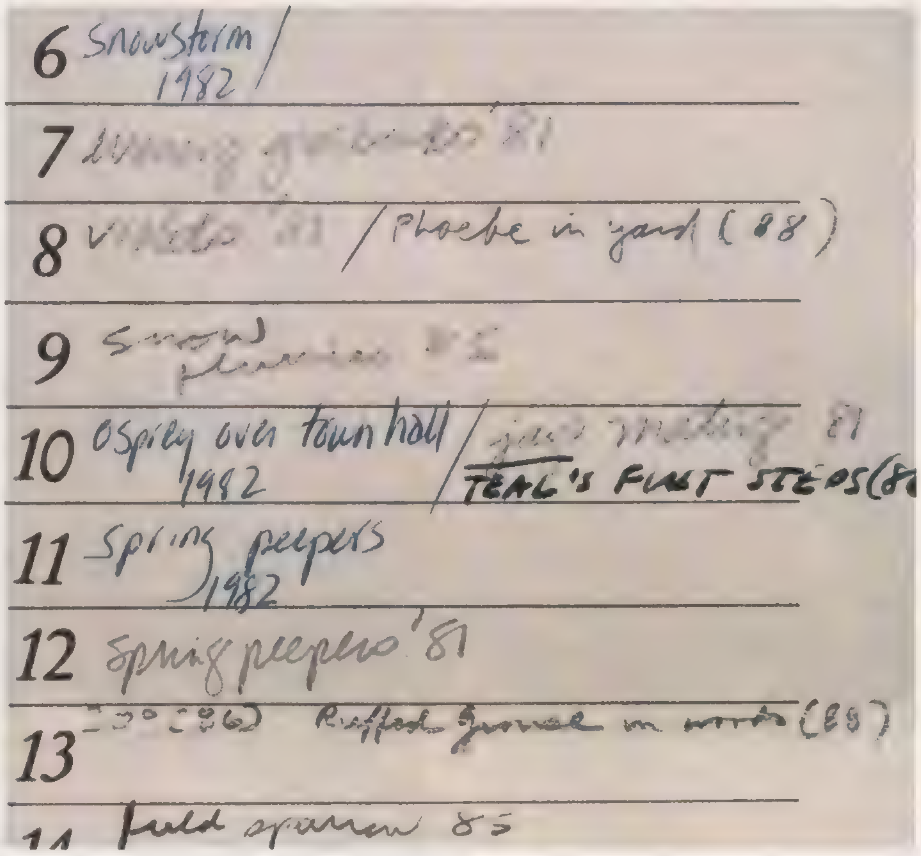
B: Me too. Do you think he keeps a month list?

C: Ha! I wouldn't be surprised if he keeps a "seen in Maine but not in Utah" list.

In many birders' minds listkeeping has come to be associated with frivolity. Some birders have stopped keeping lists or keep them but won't admit to it. This is a shame because the best cure for the stuck-at-home blues is more listing, not less.

Real birders keep lists. Each check mark is a pleasant tick of satisfaction and mission accomplished, and more important, each helps establish the context for future discoveries. If the Barrow's goldeneye has been a glaring blank on your list for five or six years, when you see one the moment is all the sweeter. And the more lists you keep, the sharper your sense of context will become. Start keeping a month list and you're more likely to know when to expect the golden-crowned kinglet each spring and when to say farewell to the scarlet tanager each fall. Start keeping a "birds identified by song" list and you're more likely to discover such reclusive species as saw-whet owl, mourning warbler, and Bachman's sparrow in your local woods.

Locality listing is like wine tasting—a pleasure that must be cultivated. Any novice can enjoy a life bird, and most birders I know spent their first few years driving or flying increasingly long distances to add new birds to their life lists. But there's little inherent challenge in lengthening a life list. It generally depends on your freedom to travel—because almost all rarities are only relatively so. In fact, with the exception of Bachman's warbler, the Eskimo curlew, and a handful of other severely endangered birds, you can chase down any bird pictured in your field guide given sufficient funds, a passport, and 48 hours of travel time. Long-tailed jaegers are easy to find in Alaska, as are bridled terns in the West Indies and snail kites in Argentina.



6 Snowstorm 1982 /

7 [illegible] '81

8 [illegible] '81 / Phoebe in yard (88)

9 [illegible] '8[illegible]

10 Osprey over town hall 1982 / [illegible] '81 / TEAL'S FIRST STEPS (8

11 Spring peepers 1982

12 Spring peepers '81

13 [illegible] Ruffed grouse in woods (85)

14 field sparrow 85

A perpetual calendar in which you jot daily sightings is an excellent consciousness-raiser.

For those with limited funds or limited time, locality listing is a way to bring back the thrill of new discoveries. In the travel time saved by staying near home, you can narrow and deepen your focus. Since rarities are relative, the thrill of a discovery depends on the context. The more familiar you are with the birds of your local area, the more you can appreciate the unfamiliar. A pileated woodpecker in the everglades is a bird to yawn at; a pileated flying over my house—one I can add to my county, town, and yard lists—is a bird to shout about.

During a dull pelagic trip one recent weekend, a birder who shall remain anonymous (unless you know who captained the winning team in the World Series of Birding in 1986 and 1987) confessed that he kept an "all-time in-state month" list, that is, he keeps track of all species he's ever seen in New Jersey for each month of the year. Admitting this, he shook his head, "I'm crazy to do it, I know."

I've been keeping an "all-time in-state month" list ever since.

Here are some other ways to enrich your local birding by keeping written track of the birds you encounter.

Start a perpetual calendar. All you need is a calendar with lots of space for each day; weekly appointment calendars are the right size. Hang one in the kitchen or some other accessible spot, jot down your daily sightings, and when you reach December 31, flip back to January 1 and start again. After a year or two, the calendar will become an excellent memory-jogger and consciousness-raiser.

It wasn't until we started a

Jack Connor is the author of *The Complete Birder,* just published by Houghton Mifflin.

perpetual calendar in our house that I noticed that fox sparrows never seem to reach our neighborhood until February (where are they in December and January?), that pine warblers start singing between March 30 and April 8, that barn swallows return between April 18 and April 28, that our local wood thrushes have never sung before April 15, and that the fall migration window for common nighthawk is amazingly brief: between September 4 and September 10.

Other natural history notes are recorded too: the coldest day in January, the rainiest day in March, the first mourning cloak butterfly, the first spring peeper, the 100-degree day in July, the 40-degree day in August, the last fireflies of summer, the first hard freeze.

Survey breeding birds. Many states are currently conducting breeding bird atlas projects to map the distribution of their nesting birds, and you might link up with an official effort; most are begging for more participants. You can also start your own mini-atlas. Which species are you certain breed in your county, town, yard? How many have you observed mating, building nests, sitting on eggs, or feeding young?

Study the seasonal movements within single species. Find a migratory, locally common bird with distinctive plumages for age or sex, and start counting the occurrences of each form. The brownish, finely barred tails of immature red-tailed hawks, for example, make them easy to distinguish from adult red-tails. Are immatures or adults more common fall migrants in your county? Which age group is more common in winter? In summer? Which sex of kestrel is more common in each season? What are the peak periods of spring migration for male and female northern harriers? For fall? Unless you live in some intensively birded hot spot, it's a good bet you cannot find the answer to any one of these questions in your county checklist or state bird guide. Your listkeeping—I mean, field work—could be the first study of its kind conducted in your area.

Plug up some personal knowledge gaps. All of us have blank spots in our knowledge of common birds which can be eliminated only by concentrated attention and careful note-taking. The adult sexes of both the cardinal and the robin can be distinguished in the field by any alert birder. Have you ever noticed whether both male and female of these species contribute to nest building? What about hairy and downy woodpeckers—do both sexes drum? If those puzzles aren't tough enough for you, how about separating a juvenal-plumaged killdeer from an adult? And how many gull plumages can you identify? Have you ever noticed which month of the year the wintering gulls of your area acquire their summer plumage?

How about keeping a list of the seasonal sequence of the songs of the most common birds in your neighborhood? Which sings earlier in the year—titmouse or chickadee, towhee or catbird? And which warbler songs still puzzle you? Have you ever noticed that the songs of some of the most common ones—redstart, black-and-white, yellow-rumped—are the hardest to identify?

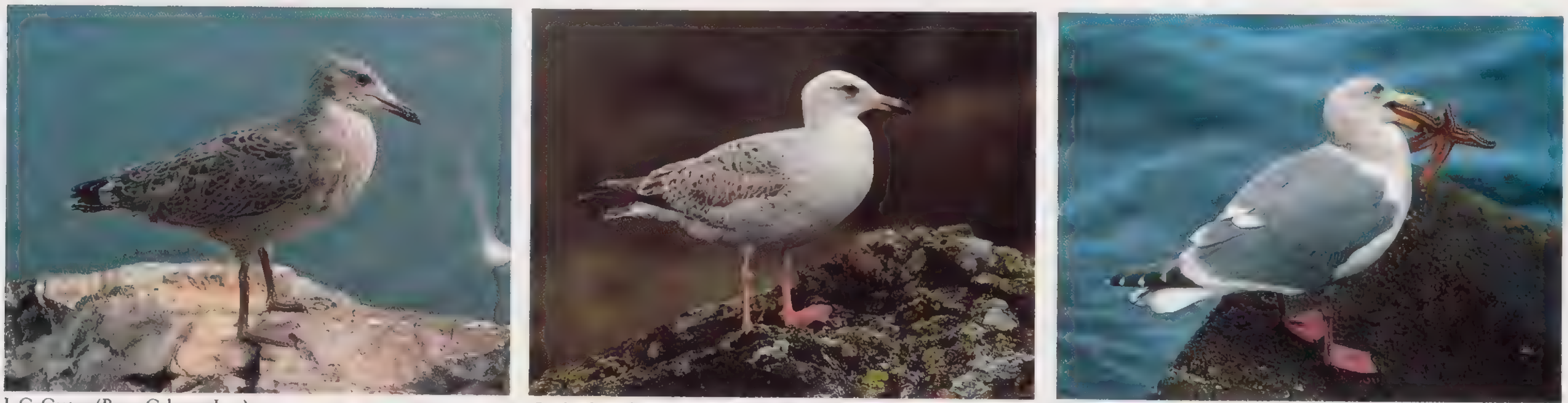
The only real problem with locality birding is that it's tough to brag about your discoveries. Since knowing the context is essential to feeling the thrill, you might not find anyone who understands why you're so excited.

I was dawdling through the woods across the street last March 18 when I was jolted awake by the song of what I assumed was a wood thrush, a month early. "Wow, a new early arrival date for the state!" I crashed through the catbriers, lifted my binocs, and found myself looking at a hermit thrush, head thrown back, singing strong. The hermit thrush is a regular winter visitor here but is absent in the nesting season, and until that moment I hadn't realized I had never heard its song or known how beautiful a song it is.

Driving to my bird club meeting in Philadelphia a few evenings later, I was determined to stand up and ask, "Has anyone ever heard a hermit thrush singing in Burlington County, New Jersey?" But somebody stood up first to describe the white-tailed tropicbirds he'd just seen in Puerto Rico, the next person was just back from a trip to Newburyport, and somebody else had slides of the prairie falcons and golden eagles he'd photographed out West. I suddenly had a bad case of the stuck-at-home blues, kept my seat, and said not a word to anybody.

But I have started a "birds heard singing within walking distance of the house" list.

—**Jack Connor**



During winter, herring gulls abound almost everywhere. Can you tell a juvenile (left) from a second- or third-winter bird (middle) from an adult (right)?

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Front Cover: Tim Fitzharris used a floating blind to photograph this snowy egret, which is busily preening near its nest on a small island in Pelican Lake, southern Oregon. In the early 1900s snowy egret populations were devastated by hunters seeking the beautiful breeding plumes. Today the species has recovered in most areas.
Back Cover: Gray jays are among the boldest of birds. They feed readily from the hand and enter tents and buildings to steal food and inedibles such as matches or pencils. Photo by Dan Polin.

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Dunne It Again

I'm responding to Pete Dunne's article "Putting a Dead Bird to Roost" (Spring 1988). I regard it as an indictment of bird collecting in the name of science, especially collecting to confirm identification or the occurrence of a given form of bird in a specific place at a specific time. The point that Dunne attempts to make is that ornithologists no longer need to kill birds to identify them correctly because we now have other reliable means of identification—he mentions photography, and to that I would add sound recording. Dunne also points out, correctly, that field observers these days are much better equipped to identify birds than were their counterparts of yore.

I fear, however, that Dunne is guilty of erecting a straw man. While the American Ornithologists' Union Checklist Committee might prefer a specimen for documentation—since a specimen remains the most reliable evidence—Dunne admits that the committee also accepts an "unequivocally identifiable photograph." He then dismisses this point, however, and continues as if only a dead bird itself is an acceptable record.

I feel that what Dunne really wants is for the committee to accept *equivocal* evidence, for example, clear and unanimous sight identification of a bird by two or more expert observers. And that, I'm sure, is not good science. Who is to decide which observers should be trusted? Not long ago I attended a meeting of the committee on the acceptance of sight records in Florida. I quickly learned that there are differences of opinion concerning who is reliable and who is not, even in this small group. I'm afraid there is no way to certify observers without creating some dissatisfaction.

Perhaps more central to the article, though I am guessing, is that he is simply against the killing of birds, period. If true, I wish he had said so, for I can understand this feeling. I know that it is from the heart and therefore not expected to be rational. At the same time, I believe that laws barring bird collecting would seriously injure the science of ornithology. There are many important reasons for collecting birds—to study molt, anatomy, food habits, pesticide residues, fat deposits in relation to migration, and to collect tissue for biochemical studies of systematics. Would Dunne deny these needs?

A final note: general collecting is rare these days, at least in North America. As a curator of birds at a large natural history museum, I don't even have a collecting permit, only a salvage permit that allows me to access accidentally killed birds. I can with effort obtain a collecting permit for a specific research project, but federal and state authorities do not grant such permits casually, and when they do they monitor collecting activity with considerable vigilance.

Perhaps Dunne is upset about something that is by and large an activity of the past.

John William Hardy
Curator in Ornithology and Bioacoustics
The Florida State Museum
Gainesville

As longtime supporters of the Lab, we were disappointed and disturbed to read Dunne's column. Although we recognize that the essay does not necessarily reflect the views of the Laboratory or its staff, we feel that Pete has done the Lab a disservice. *TLBQ* has always strived to foster an understanding and appreciation of modern ornithological research in its amateur readers. Dunne's article, however, was dangerously unscientific and largely irrational.

Much of our research is based on collecting birds. This research includes studies of geographic variation, systematic relationships, population genetics, vocalizations, food habits, and ecology, as well as inventories of remote tropical regions which are essential to develop wise conservation policies. Anyone who believes that enough bird specimens already exist in museum collections to properly carry out this research is misinformed. Further, only a small number of specimens are collected to document the occurrence of specific records—the practice that Dunne specifically attacks. And even these specimens do more than document; they also provide information on geographic origin, age, sex, and reproductive and physiological condition that can broaden our view of the biology of vagrants.

As for Dunne's main points, we see several flaws in his logic. Can he really be so naïve to think that all birds are positively identifiable in the field? Even the finest optics may not be sufficient to identify all individuals (for example, some *Empidonax* flycatchers, juvenile stints, and some immature gulls). When unfamiliar species are involved, even experts may be unable to document a record sufficiently with written details alone. The majority of bird occurrences can be documented adequately with photos or tape recordings, however. Such records are welcomed and accepted by the A.O.U. (a fact that Dunne acknowledges and then ignores). In fact, most recent additions to the North American list were based on photos, making Dunne's entire argument virtually moot. Yet Dunne apparently takes offense at providing even photographic documentation for his records. This suggests that he fails to recognize the real reason for providing verifiable documentation. Bird lists should be collections of scientific facts, facts that accumulate through the gathering of evidence that can be repeatedly scrutinized. One hundred years from now ornithologists should be able to independently reevaluate the evidence to support the inclusion of a species on any bird list, and make judgments anew. This is not possible with written descriptions alone.

What we found most offensive in Dunne's essay, however, was the frequent implication that "shotgun ornithologists" are a nearly extinct lot who value dead birds more than live ones and who pursue a philosophy that died 60 years ago. Here and at many other institutions a growing number of young ornithologists devote much of their lives to the study and appreciation of living birds but also recognize the contribution that continued, judicious collecting can make to modern ornithology. That Dunne depicts those of us who sometimes shoot a bird to study it as enemies of those striving to further knowledge of field identification is sadly ironic.

Kenneth V. Rosenberg
Theodore A. Parker III
Thomas S. Schulenberg
John P. O'Neill
H. Douglas Pratt
Museum of Zoology
Louisiana State University
Baton Rouge

I took umbrage at Dunne's article because it insists that his is "the only way" this story can be written. The article is a specimen in itself, though it doesn't quite tell me whether Dunne is leading a charge up San Juan Hill or just talking tongue-in-cheek. Isn't it gross exaggeration to claim that "people began to appreciate and value living birds" only after the invention of the binocular? What about the English poets?

What Griscom really did for ornithology was to free the *amateur* from the need to kill birds to identify them. He remained a collector of rarities and new forms to the end of his days because he knew science must be able to reexamine the evidence for our always somewhat inconclusive conclusions.

If our optics now permit us to distinguish species the shotgun school of an earlier day could not even distinguish in the hand, it is mostly because students of specimens have shown us how to do it in the intervening years.

Dunne ends by nailing his theses to the door, only six "I believes," thank God. Only the first will win unaminous acceptance, since it is obvious that a live bird is more important than a dead one. But some birds, if properly preserved, may have importance after death. What science is trying to do is to arrive at the truth, where truth means the conformance of appearance to reality. No easy task, as it is fraught with the hazards of warped perception, the social order of the moment, the sophistication of our analytical tools, and our intuitions. The results, still tentative, get into field guides only after a lot of sifting and culling by a variety of scholars, writers, artists, and editors.

The story is far from finished.

Roland C. Clement
Norwalk, Connecticut

I was glad to see that you chose to publish Dunne's article, although it could have used a more critical review of its factual contents.

Dunne made several valid points about collecting. Although it has declined in recent times, there are still collectors and institutions who persist in taking rarities that are easily identified in the field. For example, two Wilson's warblers were collected recently from coastal South Carolina because they represent the first specimens from that area.

I submit that collection of that sort is irresponsible and absurd from a scientific perspective. A photograph would have sufficed. There are many birders in that area who would have loved to see those birds in the field. I believe that Dunne meant to condemn this sort of collecting, not the collecting activities of scientists at major institutions engaged in studies such as bird anatomy and DNA hybridization. There are instances when rarities should be collected, but only after field identification techniques and photographic analyses have been attempted, or when a bird is deemed likely to leave an area.

Again, I was pleased that Dunne's article appeared, although I'm sure that not everyone will agree with him or with your decision to publish the article without censoring.

Paul Kerlinger
Director, Cape May Bird Observatory
Cape May Point, New Jersey

Thank you so much for Dunne's article. I am a subpermittee bird bander at a wildlife sanctuary in north-central Texas, and many times our banding group has been scoffed at because we refuse to snuff out or squeeze a captured bird for one reason or another.

I am a halfway decent photographer and there has never been a time when I haven't been able to photograph the necessary data for identification. But even so, getting other banders and the U.S. Bird Banding Laboratory to accept the photos is another story. I also think there are too many institutions that collect birds in the name of science just to add to their collections.

We have laws that forbid the shooting of these birds by the layperson. How about one for some of our so-called ornithologists? Once again I commend you for printing the article and maybe, just maybe, it will make someone think twice before pulling the trigger.

Helen L. Hoffman
Dallas, Texas

Add my hearty bravo to Dunne's article. The A.O.U. certainly is archaic in its stand on nonspecimen records. Being an amateur bird photographer, I would rather glean one worthy photo out of thousands than have a collection of dead birds to prove I saw them. We must preserve our living birds else we shall continue to lament the extinction of species forever.

John Delevoryas
Department of Music
San Jose State University
San Jose, California

"Putting a Dead Bird to Roost" touched a nerve that seems to run from ornithology's Achilles' tendon straight to the knee.

My interpretation of the piece was that it decried the categorical rejection of sight identification. To those who interpreted it to be an indictment of purposeful, scientific collecting, I suggest you read it again.

Excuse me if I fail to regard as a purposeful scientific endeavor the shooting of birds with inner ear problems that wander across arbitrary political boundaries.

While we're on the subject, I submit for the benefit of prudent minds that the advocacy of specimen records in 1988 A.D. serves only to jeopardize a valuable scientific tool. And though it is of little concern to me, I might point out, as an old political scientist, that a Maginot-Line defense is not going to outflank an historic inevitability. —P. D.

Thank you, readers, for your comments on this controversial subject. May we point out that views expressed by various authors, including our contributing editors, are not necessarily those of the Laboratory of Ornithology.

Sight Records: Fact, Fiction, and Faith

Pete Dunne's five commandments of birding faith (*The Living Bird Quarterly*, Spring 1988) challenge all ornithologists, especially those of us who are trying to build bridges between birders and scientists. The science of ornithology is built on centuries of combined contributions by amateurs and professionals who have worked in concert with respect for each other. Pete's self-professed faiths both malign the many professional contributions of Ludlow Griscom, who appreciated specimens, and threaten the foundations of the fundamental partnership between birders and ornithologists.

Certainly the powers and potential contributions of birding with binoculars rather than shotguns have grown to extraordinary levels in the last 20 years, levels of skill that Ludlow Griscom probably never envisioned. And certainly we now have in our midst a small set of superbirders, whose field identification abilities routinely add the impossible to their daily lists. Yes, we have pushed the frontiers of field identification to new levels. We are less reluctant to report a Pacific loon or an arctic tern, but as the difficulty of identification increases so does the margin for error, even by superbirders. And there will always be some birds that cannot be identified reliably in the field. So the issue becomes when to believe a report and when to be skeptical. I suggest that the following are indisputable facts that bear on this question:

(1) Field identifications typically are biased by probability based on experience, and by possibility based on the local grapevine or hotline. How often, for example, does any birder carefully scrutinize each peep in a large flock, rejecting all vagrant possibilities, including little stint and long-toed stint? Instead, we normally assume they are all semipalmated and least sandpipers unless something really odd stops the scope in midswing across the mudflat. But as soon as someone reports a rufous-necked stint, the search effort is transformed, with a curious result. In one case, some enthusiastic birders left Port Mahon, Delaware, tickled "rufous" to have found the reported stint, unaware they had just misidentified a sanderling or western sandpiper. To belabor this point with a prediction, there will be a growing flood of reports of "Cox's sandpipers" from North America now that its occurrence seems to be a possibility. Some of the reports might even be correct, and we may grow to realize Cox's sandpipers are regular in Massachusetts. Back to the problem of fact versus fiction.

(2) Field identification skills are based on first-hand experience, and even superbirders do not know first hand all the possibilities. The problem with vagrants is that typically they are unfamiliar species from some other part of the globe. Few of the experts that claim to confirm the identification know the species well in their native haunts. Even if it is not a life bird, the expert's experience with little stints in Africa, for example, involves totally irrelevant comparisons with a different set of common species. Further, if the vagrant in question is possibly a Caribbean elaenia, for example, not only must the expert know that species cold, but he must know all the other elaenias in Central and South America, COLD, or else he is just guessing, hopefully with humility. The way to identify elaenias, like so many birds, is to know where you are and what alternatives are likely; no one tries to eliminate all other members of the genus. Unfortunately a vagrant elaenia might come from anywhere, so the superexpert must put aside his pride and his encyclopedia of experience and start cautiously from scratch. He becomes, sad to say, a beginner all over again. Whatever he concludes will be challenged. The debate and uncertainty will worry the conscientious. Fact or fiction? What do we accept?

(3) Some vagrants simply cannot be identified with certainty in the field, even by superbirders. Aside from the elaenias, which symbolize real cases considered recently by both the A.B.A. Checklist Committee and the A.O.U. Checklist Committee, there are others that truly challenge us, such as migrant and winter *Empidonax* flycatchers, which cannot be convincingly identified all the time. We are just discovering that December *Empidonax* on the East Coast are quite likely to be Hammond's flycatchers, not least flycatchers (Gibson 1987, *The Wilson Bulletin*). We only know this because some were collected and compared critically to existing museum specimens. One specimen was even misidentified as a least flycatcher by an expert ornithologist, probably because he didn't consider the possibility of a western stray. How often do eastern birders objectively eliminate a western flycatcher when they see a migrant yellow-bellied? And now with the split of the western flycatcher into two species, soon to be named, how reliably will we be able to identify any yellow *Empidonax*?

(4) Most birders are not superbirders. Each year, most of us bumble enthusiastically through the annual refresher course—time to relearn those warbler songs and sandpiper sizes again—with a discouragingly spotty memory of all the field marks of all the birds we can expect to see. Most of our identifications are O.K., and they typically are of species no one will challenge anyway. Most of us realize that we are fallible and misidentify a few here and there. But we do it for fun, and our accumulated sightings contribute to ornithological knowledge about bird distributions and seasonal movements. In some cases we help document the arrival and spread of new species on this continent, and it is here that the issue of fact versus fiction becomes a serious issue, one that Pete Dunne mocked in a most unfortunate way.

We must remind ourselves of the purpose of the A.O.U. Checklist, which Pete challenges as irrelevant and archaic. This premier checklist documents the facts about the distribution of North American (and Central American) bird species. Compiled carefully by experts of considerable stature it is, and always should be, a conservative document, not prone to speculation or to acceptance of uncertainties, which then will have to be changed in future editions. Reasonable doubt opposes the conclusion of fact, and so results in the rejection of some records. Facts also must be verifiable in the future, hence the need for good documentation—photographs, tape recordings, or specimens—that permit expert scrutiny and bear up to critical challenge. Otherwise, we would base our science on fiction, on possible myth. Certainly, with the advent of extraordinary binoculars and cameras, specimens dropped by shotguns no longer must prevail as a means of identification or verification. At times, however, a specimen will be desirable and even essential to confirm an identification, to separate fact from fiction. So I suggest that we all—ornithologists, birders, and superbirders alike—humbly recognize our limited skills and our occasional fallibility. If we do, birding and ornithology both will prosper.

Frank B. Gill
Vice-President
American Ornithologists' Union
Chairman, A.B.A. Checklist
Committee

FROM THE EDITORS

On our masthead we list our contributing editors, those diligent and devoted columnists who, although not Lab staffers, are indispensable to the magazine. For a small fee and with a little prodding they regularly provide us with clear, witty, and timely articles on subjects of their own choosing.

Last quarter we introduced Jack Connor, our newest contributing editor. This time we feature Pete Dunne. As you may have gathered from the letters on the previous pages, his column of last spring was somewhat controversial. Considering the hubbub, we thought you might like to know more about Pete, preeminent birder, storyteller, conservationist, and gadfly. So, in a recent phone interview we opened with a standard query. "Pete," we asked, "How did you get started watching birds?"

"I guess it was in 1975. Although I was spinning on stripped threads at that point, I realized I wanted to spend the rest of my life watching birds. That fall I went to Hawk Mountain, became enamored of birds of prey, and spent the next three weeks driving 200 miles a day to get there. That November I approached the New Jersey Audubon Society with a proposal to conduct a spring hawk watch on the Kittatinny Ridge, essentially for peanut butter and jelly money. They couldn't turn me down."

Thus a lad from rural New Jersey took his first step toward becoming the New Jersey Audubon Society's director of natural history information and one of birding's most quotable spokesmen.

"What happened next?" we pursued.

"Actually, I started birding even earlier," he mused. "I've been bird watching full time since December 1974. I had just graduated from a small college in New Jersey with a degree in political science and I had a good job installing carpet. But I knew I didn't want to do that forever and, falling back through my cards, I realized that watching birds gave me the most pleasure. So I awoke one morning, stretched and yawned and thought, I think I'll go to Cape Hatteras and watch birds. I picked up my field guide and binoculars and left."

"That was before Hawk Mountain?" we probed.

"Right. But, you know when I started watching birds? At the tender age of seven a neighborhood girl came by with a bird book and a pair of binoculars that a kindly uncle had bestowed upon her, and she said 'let's go on a bird hike.' So I did."

Aha, we concluded. So that's how Pete Dunne began the trek that led to his becoming staff naturalist then director of the Cape May Bird Observatory, to his founding of the World Series of Birding, to his column in *The New York Times*, to numerous magazine articles and books, such as his recent *Hawks in Flight*.

After hanging up, though, we felt somewhat befuddled. So we pored over some old copies of the *Peregrine Observer*, the Cape May Bird Observatory newsletter Pete used to edit.

In the fall 1984 issue we hit pay dirt. Wrote Pete: "I was four and it took all my stealth and cunning to get to my father's desk undetected. . . . It wasn't the papers in it that interested me. It was the contents of the second drawer on the right—the one where the treasures were housed, neat things like coins, army medals, a pocket watch that didn't work, pictures from the olden days, and a magic look-through thing. If you held it to your eyes, it made the world look smaller. But when you looked through the other end, the world got bigger."

Thank you, Pete, for straightening us out on this point. In a future column perhaps you will reveal how a boy from rural New Jersey became one of this country's most knowledgeable bird watchers.

The first California condor conceived in captivity hatched April 29th at the San Diego Wild Animal Park. The birth was welcomed by conservationists throughout the world because it demonstrated that California condors can breed in captivity—a milestone event, considering that the entire population consists of 28 captive birds.

Hopes for the condor birth began to rise March 3rd when an egg was laid by a condor designated UN-1, at the Escondido, California, park. The staff's optimism was cautious, however. Although 13 other condors had survived captive hatching, their eggs had been taken from the wild. An egg had never been produced in captivity.

The egg was left briefly with the mother, then removed to an incubator to encourage the parents to double clutch (lay another egg). Candling of the egg revealed a healthy embryo and the long vigil began. The egg was turned 180 degrees twice daily to mimic the mother's behavior in the wild.

Caution gave way to enthusiasm when the chick began to break through the blue-green shell. At that point, Curator of Birds Bill Toone and a team of condor keepers treated the chick with special attention. It was serenaded with the taped sounds of a turkey vulture breathing and claws scraping through sand to simulate conditions in the wild.

The keepers had been egg sitting nearly 61 hours when they decided to intervene. Based on experience with other condor deliveries, they knew that a prolonged hatching could weaken an already exhausted chick trying to complete the job on its own. Donning gowns, masks, and gloves, they used fingers and forceps to gently peel away pieces of the shell.

Finally the scrawny chick appeared, with eyes closed and down matted, weighing 6¾ ounces. Named Molloko (the northern Maidu Indian word for condor), the chick was placed in a baby isolette for examination and later fed the first of its hourly meals, minced mouse and egg yolk. Molloko was subsequently fed by a puppet resembling an adult condor to prevent the chick from identifying too closely with humans.

The healthy bird's appetite has increased during the last few months, and its diet has expanded to include a commercial cat food.

Molloko's future role will likely be the same as that of the 27 other condors: to produce chicks for release into the wild in the early 1990s.

—*David L. Robinson*

WILL POWER

Beyond your lifetime, birds will live on. So can your interest in them. With a little planning and a provision for the Lab of Ornithology in the form of a charitable bequest, your love of birds will endure. The task is simple yet the potential reward for our world's birds is tremendous. In addition, your action now may save your family estate taxes later. We can help ensure that your involvement with birds does not end with your lifetime.

For more information, please contact Scott Sutcliffe, Office of Public Affairs, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850. (607) 254–2424.

Electronic Birding

Here's a futuristic vision: Your six-seater solar-powered hovercraft, on idle, hums and sways gently at the edge of a favorite birding spot while, 50 yards away, you and your companions stare intently through binoculars at an unfamiliar species of *Empidonax* flycatcher. As you listen to its call—a loud *wit*—and watch the bird move around, you all—naturally—argue about its identity. You agree that the bird is one of the western "empies," but is it a gray flycatcher, or a dusky, or a Hammond's, or a western? Finally you say, "I'll go check the video." You sprint to the hovercraft and turn on a computer in the dashboard; a 20-inch screen rises into view, and a keyboard slides out above your lap. You type "EMPI. USWEST.SUMMER." and seven seconds later the supersharp color image of a gray flycatcher in summer plumage, perched in a yellow pine in Arizona, appears on the screen. As you watch, the image flies out after an insect, then returns to its perch, utters a sharp *wit*, and dips its tail gently downward a couple of times. Aha! The call note is right, and you had noticed that tail wag as characteristic of the bird your friends are still studying. Maybe you have a bull's-eye here on the first try.

You press the scroll key to look at the dusky and the Hammond's and the western, and none of those images has the tail-dipping habit or sounds quite like the gray. You ask the computer to show you in split-screen projection the key field marks of all four species, side by side and from a variety of angles, and that confirms the identification. "It's a gray," you shout as you press the repeat key. "Come see!"

I look forward to having that resource in *my* six-seater solar-powered hovercraft, I can tell you. I imagine, for instance, zipping along the highway toward a shorebird hotspot (with the automatic pilot reading the map of the route), while we use the videotape and computer to refresh our mental images of the sandpipers, including the European stints. Or heading to Hawk Mountain in the fall while watching tapes on the identification of raptors in flight.

I'd be delighted if right now I had at my disposal a first-rate video field guide to the birds, even without a hovercraft. In fact, if such a guide were available, I'd finally break down and buy a VCR. The trouble is, the bird imagers and video producers have many miles of film and tape to shoot and edit before anyone brings out the field guide I want. But the process has begun; it has given birth to a couple of pioneering commercial efforts, and examining them gives us some clues to what needs doing.

The two available video field guides were written, directed, and narrated by Michael A. Godfrey. Godfrey—who must be tired of being routinely identified this way, as if it were permanently bonded to his name—is the son of the late radio and TV star Arthur Godfrey. His video guides, both issued in 1985, are the "Audubon Society's VideoGuide to the Birds of North America," part one ($74.95), distributed by MasterVision in collaboration with the National Audubon Society; and "Ducks Unlimited's VideoGuide to Waterfowl and Game Birds" ($74.95). Godfrey coproduced these videos with Richard Stadin, president of MasterVision.

The Audubon VideoGuide is the first in a projected set of four two-hour tapes, and it deals with the loons, grebes, pelicans, geese, ducks, diurnal raptors, and chickenlike game birds. I reviewed this offering in *Natural History* in the fall of 1985, and I recommended that no one spend money for it. It offers very little of value that isn't already available at much less expense in the most recently published field guides and audio tapes. In fact, the video copies in considerable detail the approach used by printed field guides.

I'd be delighted if right now I had a first-rate video field guide to the birds, even without a hovercraft. In fact, if such a guide were available, I'd finally break down and buy a VCR.

It covers more than two-thirds of the species by showing still photographs—not all of them good ones—and animated range maps while Godfrey reads a narration. The text is often well behind the cutting edge of knowledge about identifying birds and is occasionally downright wrong. In the species treatments that do use motion footage of birds, most of the sequences are no more than three seconds long. Here and there, computer-drawn animated bird profiles demonstrate identification tips, but the cartoonlike animation achieves nothing that an unanimated drawing couldn't provide. The recorded songs and calls that accompany many of the species descriptions are so brief that they don't always represent the full range of vocalizations.

One of Godfrey's main production problems was that good motion images of many bird species, suitable for a guide to identification, had never been shot. But the decision to mimic the printed guide technique, using still photos and range maps and formal texts for each species, greatly limited his results.

One alternative would be to seek effects impossible with a printed guide: Forget the picture and text and range map for each species; they take up a great deal of space and will always be better handled and more accessible in print. Instead, show motion sequences of birds, particularly of species that many of us have trouble separating from other species in the field. Have one of the well-known young bird-identification hotshots do the narrating, chatting knowledgeably about the birds, rather like a trip leader on a bird walk—except this walk would be something only video could create.

Godfrey's 75-minute Ducks Unlimited cassette follows the same pattern as the Audubon tape and recycles some of that material. Again, a good many species are not shown in motion. Nonetheless the results are somewhat better, chiefly because there are fewer species to cover, which makes room to use more motion footage, some of which is excellent.

One purpose of both these videos is to encourage conservation. Greater public knowledge of birds can lead to better bird protection. I've read that Michael Godfrey feels truly desperate about our rapid destruction of the environment and that he behaves rather like a medieval ascetic on a holy quest, batting around North America in his van, living simply, often sleeping beside the road, cadging showers from friends along the way, and making videotapes of birds. Well, that's the sort of effort and single-mindedness required to accomplish the task. And we need the accomplishment.

If Godfrey and Co. aren't up to speed yet with their field guides, a couple of other production teams have achieved good results by concentrating on the more manageable subject of bird watching as an avocation, and relegating matters of identification to a supporting role. For one, Metromedia Producers Corporation and the Houghton Mifflin Company offer "Watching Birds with Roger Tory Peterson" ($65.00).

This 55-minute videotape first appeared five years ago and is aimed at the novice birder. It is in part a shamelessly obvious advertisement for Peterson's estimable print field guides. Still, the genial old master, playing host, overcomes that handicap and helps the production also sell birds and birding. The tape comprises 28 minutes of introduction to the subject, followed by a 24-minute segment that combines an unpretentious narration and motion color images and audio recordings of 52 common North American bird species to teach the beginner how to look at and for birds. Some of the footage is wonderful, and "Watching Birds . . . " is pleasant and informative. It reminds me of the early phonograph records of common bird songs issued by the Laboratory of Ornithology, which taught novices how to listen to birds and helped them sort out the songs they were likely to hear most often.

Nature Videos, a California company, has also issued an aid for beginners, "Techniques of Birding" ($29.95), with Arnold Small as host. Small is author of *The Birds of California* and past president of the American Birding Association. He doesn't seem as comfortable as Peterson in front of a camera, and the production suffers from a few obvious problems, particularly its uneven audio levels, but on the whole this hour-long program is a fine, workmanlike job—and very different from the Peterson tape.

Arnold Small walks us through a remarkable collection of things a birder ought to know, including selection and care of optics; how to locate birds with your binoculars and how to describe a bird's location to any birders alongside you; the virtues and methods of squeaking and pishing; where, when, and how to find birds; the birding literature, bird recordings, and checklists; how to use field guides; the need and techniques for keeping good field notes and a birding journal; the topography of birds and sexual and age differences in plumage; and making use of the birders' network.

FOWL-LIKE BIRDS

KAT DALTON (2)

Host Roger Tory Peterson works his magic into the "Watching Birds" video, beckoning the novice to follow him up the trail to further knowledge of 52 North American bird species.

Our host and teacher is often replaced on the screen by images of birds in motion—more than a hundred different species—and the producers have included in the cassette case a list of those species and the minute and second each one appears. So, like the Peterson tape, this video can be used—with some effort—as an identification reference.

I expect that the full-dress video field guide of my dreams will become available to the general public at about the same time as the solar-powered hovercraft. That's because this is a major technological and human enterprise, requiring thousands of hours of work to achieve consistently accurate color images of 700 different bird species. Meanwhile, I'm waiting, tapping my foot impatiently. —**Michael Harwood**

SINGING IN THE ICE

Christopher W. Clark

J. L. BOWER

Twenty-four hours a day, from April to June, Clark and his crew record the calls and songs of bowhead whales as they migrate past Point Barrow, Alaska. An FM transmitter, far left, relays signals from a hydrophone under the arctic ice to antennas atop the snowmobile-pulled acoustic lab, left. Looking out from the lab in the middle of the night, it is difficult to imagine the richness of sound coming from beneath the barren ice.

The twilight of the early morning cloaks my vision in white and gray. Through a window in our thin-skinned hut, insulated from the cold by a mere inch of foam, I can make out the vague form of the 20-foot ice ridge created last night by the collision of the offshore and shorefast pack ice on which we are camped. Otherwise nothing breaks the monotony except our tents, snow machines, and sleds.

Fortunately the impact did not destroy the ice on which we are stationed or we would have lost most of the camp; however, it did wreck the acoustic equipment we had installed underwater. Buried beneath the ice are the twisted remains of hydrophones and radio transmitters which are our link to the underwater world of the bowhead whale we have come to hear.

This morning we will replace the equipment with a new set of hydrophones and transmitters, and by tonight we will be fully operational again. The reason for this ambitious recording effort sounds simple: we want to count the bowhead whales as they migrate from their wintering grounds in the Bering Sea to their summering grounds in the Canadian Beaufort Sea. To do this we have come to Barrow, Alaska; our campsite is located on the frozen wilderness of arctic ice about 12 miles northeast of Barrow. Our camp consists of three tents and this small box we call the sled shed. In this hut we will listen to and record the sounds of the arctic 24 hours a day from mid-April to early June amid the movements of the ice, the unpredictable visits of polar bears, and the constant cacophony emitted by all the animals living in the water under us.

12:10 a.m., April 19, 1988. Crew members Rachel Budelsky and John Bower have requested that I listen to some sounds. As Rachel hands me the headphones, she explains that she is hearing a faint pattern to the south that might be a bowhead whale. I am skeptical, thinking that she probably heard a bearded seal or ice groaning. But I am always eager to listen to the arctic since even after nine years I am still a novice and have much to learn.

I slip on the phones, close my eyes and let all my body, except my ears, relax. Like a diver descending into the depths of the sea, I sink into the sounds of the Arctic Ocean. The wild, surrealistic songs of the bearded seals spiral out like tendrils, pulling on my concentration, tempting me to sing with them. I pull away, fighting to place my thoughts in the whale's register, one lower in frequency and remote.

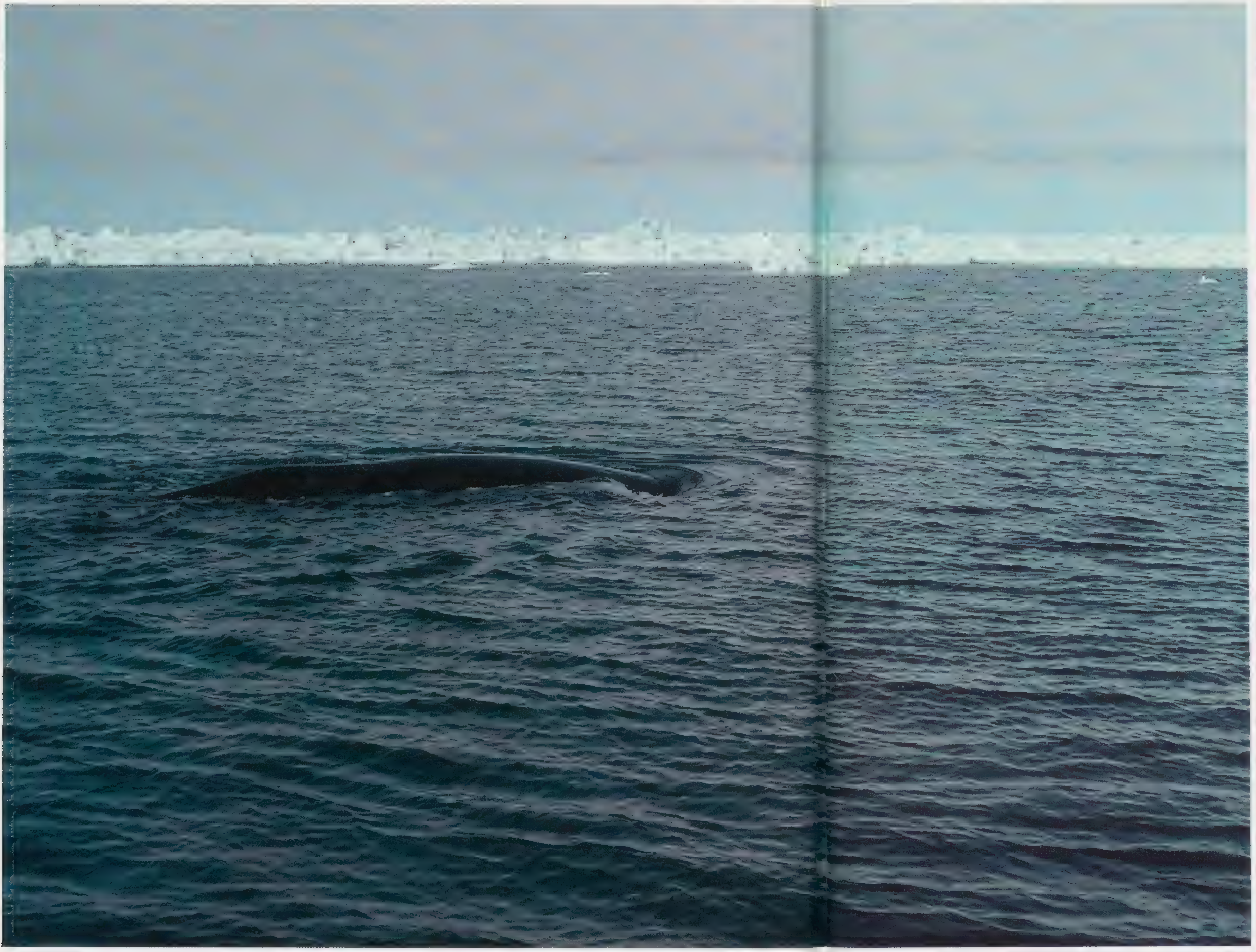
Far away, like a distant rising and falling beneath the ocean's noisy quarrel with the ice, beneath the modulations of the seals, there is something else. Almost imperceptible, I hear a distant bowhead. Faint, intermittent moans pass below me like undulating sand dunes. Then they are swamped by an upwelling of seal songs. Did I hear something? There they are again, a series of them, faint but clear. Is it a bowhead? Are these calls or part of a song? I listen for a few more minutes and then decide to turn in for some sleep.

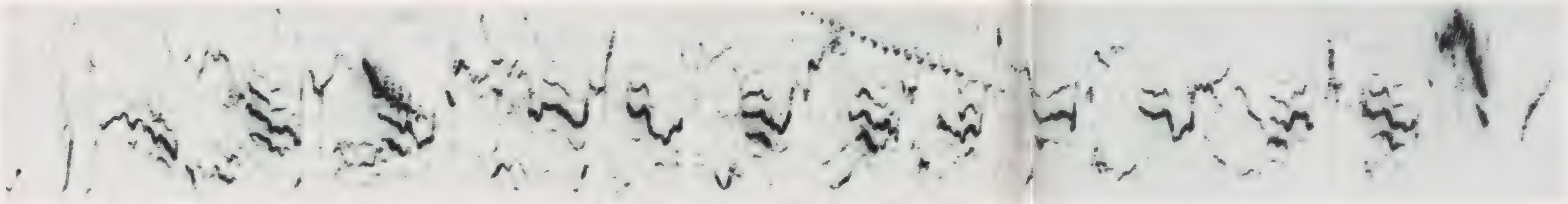
Back in the tent, shivering while bundled in all my clothes plus a double sleeping bag, I recall the time I first heard bowheads nine years ago. Jim Johnson of the National Marine Fisheries Service had gotten my name from Roger Payne, then with the New York Zoological Society. Jim wanted to use acoustics as a tool to census the endangered bowhead whale population that migrates past Point Barrow, Alaska, each spring on its way to feed in the Beaufort Sea. I had just finished my Ph.D. research on acoustic communication in southern right whales, so Roger figured I might be helpful with the bowhead work. At that point acoustics had not played a role in bowhead whale projects; population estimates were based on visual sightings of whales made from airplanes or ice-based sites.

The reason for interest in the number of bowheads was straightforward. There was a strong international conservation effort for a worldwide moratorium on whaling. The Alaskan Eskimos were still engaged in a spring and fall subsistence hunt of bowheads. And the energy industry had ambitious plans to exploit the vast deposits of oil and gas found in areas where bowheads migrate and feed.

In 1976 the population estimates were alarmingly low—1,000 to 1,500 animals. At these levels even subsistence hunting (an average of 27 whales have been killed per year by Eskimos since 1848) was seen as a serious threat to the population. The impact of industrial development on arctic animals and the environment in general was not understood but was viewed as potentially catastrophic.

The picture was bleak not only biologically but politically. The Eskimos were not enthusiastic about the federal government telling them to stop their traditional hunting of the bowhead. Industry was eager to


C. W. CLARK



produce energy for a nation that was the world's leading consumer of fossil fuels. And there was little hope of formulating a plan to protect the whales until hard data existed about the effects of hunting and industrial development on the population.

And so visual censusing began. In 1978, 1,824 whales were seen and this translated into an estimated 2,000 to 3,000 individuals. But the visual effort soon bogged down, a victim of the harsh arctic environment and the limitations of human visual perception. For most of the spring, when whales migrate past Point Barrow, the ocean is partially covered with ice, making it difficult to observe the animals. Often there are long periods with no open water and all the observers get to look at is ice. Consequently, visual censusing is restricted to what humans can see and to nearby areas of the ocean where the water is open.

D. McDONALD

Bowheads employ an extensive repertoire of sounds while navigating the icy arctic seas. Sonograms (lower left), visual representations of these sounds, help Clark to analyze the whales' vocabulary. Working at the edge of the ice, Clark's crew sometimes was treated to a bowhead waving its flukes (left).

It was at this point that Jim Johnson and I began listening to and recording the whales. First we listened in stereo using a pair of hydrophones placed 3.5 feet apart and lowered beneath the ice. With this technique we were able to determine the directions to the calling whales, thereby giving the visual counters clues to where to look. This sounds simple, but there were no field guides to the sounds of the bowhead whale. We were learning the whales' vocabulary as we recorded it. And with each auditory exposure we realized that the whales were remarkably vocal during their migration past Point Barrow. This meant that if we were clever we could track the calling whales as they swam past us. Furthermore, we could perform these technological tricks in snowstorms, under the cover of ice, and when the whales were far beyond eyeshot.

With support from the state of Alaska, the Bureau of Indian Affairs, and the North Slope Borough's Department of Wildlife Management, three of us designed and tested a customized whale location system. My colleagues were Kim Beeman, an electrical engineer from MIT, and William Ellison, a physical acoustician from the United States Naval Academy and MIT. We were all engineers with backgrounds that complemented each other. Bill knew the theoretical and mathematical aspects of underwater acoustic tracking, Kim knew the hardware and software, and I knew what the system had to accomplish.

Today, after four years of locating bowhead whales acoustically as they swim through the mosaic of ice during their spring migration, we have not only revised the way we census them, we have also begun to change our perceptions of how they live in an underwater world of ice and limited visibility.

Through the application of acoustic methods we have expanded the observation area by a factor of 40. Also, the acoustic method operates when there is solid ice cover as well as open water. So when the ocean freezes in a matter of hours as it does when the temperature drops to 40 degrees below zero, the decrease in visibility has no effect on our ability to locate and track a vocalizing whale. In fact, in some ways an ice cover is advantageous to acoustic censusing; no open

King eider by Erwin & Peggy Bauer (Bruce Coleman Inc.)

John Bower, a technician in the Laboratory's Bioacoustics Research Program, was a member of Chris Clark's 1988 crew responsible for monitoring the bowhead whale migration past Point Barrow, Alaska. Despite the rigorous work schedule, he managed to find time to watch birds.

Moments after I learned that I would be journeying with Chris Clark to the Alaskan arctic to census bowhead whales I sneaked out of our lab, hurried to the bookshop, and bought Armstrong's *Birds of Alaska.* As much as I love whales I am a birder, and the thought of seeing king eiders, shorebirds, and other arctic birds left me fainthearted.

On April 13th I was at last airborne, happily leaving Ithaca's first warm weather for the frozen north. Twelve hours later, peering down at snowy Alaska from 30,000 feet, I wondered what birds were awaiting my arrival in subzero Barrow.

The answer was soon to come. During the first 10 days, despite constant surveillance, the only birds I saw were a garbage-dump raven and a dead oldsquaw. Although it was difficult for me to believe, Lori, another birding member of our crew, promised me that millions of birds would soon be flying to the arctic to breed during the short but remarkably productive summer. She described how the arctic's long, severe winters followed by short summers were perfectly suited for the champions of migration—the birds.

I wasn't so sure. As she spoke a frigid wind shook the cook tent. We were camped several miles out onto the ice of the Arctic Ocean, and with the wind-chill, the temperature had dropped to 30 below. The snow-covered ice was so bleak and barren that spring itself seemed unlikely, a springtime burst of birds impossible.

Yet on April 24th, a glaucous gull appeared above our camp, then five more, all struggling against a brisk wind. By the 26th hundreds had flown by, and I learned that nowhere is a gull more beautiful than in the white arctic. Every glaucous gull showed different colors—some silver, some white, even black—depending on the constantly changing light. A few days later a black-legged kittiwake flitted above the open water, and an ivory gull landed nearby.

On May 5th, while repairing a microphone at the water's edge, I was startled by a whirring sound in the sky. Looking up, I was amazed to see hundreds of king eiders flying overhead. Even without binoculars there was no mistaking the comically colorful males. I was surprised at how quickly these strong fliers flew out of sight. Moments later thousands more birds in a second flock, then a third and a fourth cruised by, some birds barely skimming the surface of the dark ocean, others curving gracefully above the icebergs. As I rode my snowmobile back to camp I began to think that Lori might be right. Were these the first of the millions of birds?

From that day on, when I wasn't on duty recording whale vocalizations, I could be found perched on a tall ice ridge watching streams of eiders and oldsquaws speeding above the ocean while I waited for other species to return from the south. Since the arctic sun now shined 24 hours a day, any time was good for birding. I began to understand what tundra birds have long known—that constant daylight allows a level of activity impossible at lower latitudes. To the birds this means the opportunity to forage constantly, allowing them to raise enough young to offset the high cost of their long migration. To me the long days meant less and less sleep.

It was 3 a.m. on May 20th when the first small group of pomarine jaegers slowly made their way along the ice edge. An hour later I saw my first yellow-billed loon. How could I possibly sleep?

I didn't that night. Instead I sifted through flock after flock of eiders until I found one with a green and white head, a spectacled eider! Five male king eiders treated me to a show as they courted a female, each male rising out of the water as he cooed like a pigeon for her attention. Startled by a sharper sound, I whirled around in time to see a Baird's sandpiper alight on an ice boulder at the edge of the water. Seeming to sense that the ocean ice was beyond its tundra destination, it took flight again, announcing its mistake with constant calls as it headed back to the land.

Now, at the end of May, the constant daylight was beginning to warm the environment. With the rising temperatures seabirds poured in from the south, but the ice we were camped on was beginning to deteriorate and our bowhead whale migration study was nearly over. It was time to head back to land. After packing the camp onto sleds we rode our snowmobiles off the ice and back to the town of Barrow.

There, when I wasn't organizing data or packing equipment, I was usually birding. While the ocean we'd left behind was now teeming with birds, on the tundra they were just arriving. Spring was late and only patches of land had emerged from the snow. Still, each open area was home to a singing snow bunting. I'd always felt sorry for these boldly colored snowbirds wintering in upstate New York, but I now realized that the winter there was far easier than the first weeks at their summer home. With only a scattering of last year's seeds to feed on, and the cold and unpredictable weather to cope with, it was amazing that these birds could survive at all, let alone sing 24 hours a day.

Soon all of our equipment was stored and the bowhead census data were on their way back to our bioacoustics lab. It was time for me to leave the awakening tundra spring and return to Ithaca where rumor had it summer was in full swing.

J. L. BOWER (2)

Subsistence hunting of whales has been central to Alaskan Eskimo culture for thousands of years. Despite the infiltration of American culture, whales remain an essential part of the Eskimo diet and identity.

water means fewer extraneous noises produced by waves.

Another important asset of acoustic monitoring is that the entire migration season is permanently recorded on tapes. Thus we have the auditory equivalent of a continuous movie of the six-week migration, and we can listen to and analyze the tapes as many times as we want.

As for determining the population size, the work has provided a series of surprises, the biggest being the contrast between what our eyes tell us and what our ears tell us. It is almost as if we are observing two different populations! The reason for this is the greatly expanded area we are able to cover acoustically. The result has been to double the estimates of the size of the bowhead whale population.

This is a mixed blessing. It is good news because it means a highly endangered population, reduced by commercial whaling at the turn of the century from 20,000 to several thousand animals, can recover after 80 years of no commercial whaling and under an annual subsistence hunt. We now have real material for understanding the recovery of an exploited population, in marked contrast to our understanding of other such populations for which very little data exist.

The bad news is that higher estimates of the bowhead population have led to an increase in the quota allocated to the Eskimos for their subsistence hunting. Ironically, our improved ability to count the whales has been translated into more animals being killed.

Conflict between western and Eskimo cultures is not new. The blending of the two cultures has been difficult. We westerners complain that the Eskimos are having their cake and eating it too. They use our technology but claim that as natives they have inherent rights that are denied to us settlers. They use aluminum boats, outboard motors, FM and CB radios, and modern weapons in their hunt of the bowhead. One argument is that this is cheating, that they should stay with traditional hunting methods.

Yet who are we to make the rules? Certainly the Eskimos should be skeptical of anything we tell them. A few years ago government experts said only 1,500 whales were left. When the Eskimos told us that the migration occurs in three phases, we white western scientists asked where's the data? When they told us that the whales travel under the ice, we said that doesn't make any sense. When the Eskimos said a form of the bowhead exists that is different from the rest, we said we think you're playing a trick on us. Yet in each case the Eskimos were right. What we ignore is that the Eskimos do not exploit the whales the way Yankee culture did. The whale is central to their culture and is woven intimately into their art, history, and society. Instead of forcing ourselves upon them as teachers, we should become the pupils and learn from the example of not commercializing the world's natural resources.

Another step in our education is the growing appreciation of the communication skills of the bowhead. In the process of counting the whales we have had the chance to listen to how they communicate and to find out what they do with this rich environment of sound. We have come to realize that bowheads are highly influenced by what they hear, just as we are dominated by what we see. The bowhead listens to sounds from

the ice, wind, seals, and belugas, and most important, other bowheads. From these sounds the whales create a map of the world much the way you and I create spatial maps in our minds based on visual memories and our movements. For the bowhead the map is three-dimensional and derived from sound.

After listening to the whales for thousands of hours as they call and sing, we have clear examples of their communication. For instance, when two whales are separated by a mile or two but maintain almost identical swimming paths, they coordinate their movements by calling back and forth. At other times all the whales in a group of as many as 10 animals, spread out over 10 square miles, will adopt individually distinct calls or identical calls. In both cases we hear a constant bantering between group members, much like a flock of geese in the spring.

C. W. CLARK

Part of the 1988 crew doing the two-step. Left to right: Rachel Budelsky, Dave Nelligan, Lori Quakenbush, John Bower, Tim Kinkead, Gretchen Steiger. In front: Chris Clark.

Another interesting observation came in 1985 when a large ice floe was positioned a mile or two in front of our hydrophones. Under it was the migration path. As the first whales in the procession swam up from the south and approached the floe, their behavior changed. They increased their rates of calling and changed their path in order to detour around the ice. Then the whales behind the leaders began to detour around the floe at a greater distance and without any noticeable change in their calling behavior. We concluded that the whales were using the echoes from their calls off the ice floe to help them navigate around it. Other whales were using the same echoes from their calling colleagues to make an early detour.

Our research is revealing that bowhead whales have incredibly diverse and sophisticated acoustic mechanisms for living in the ice. They glean information about the formations of ice, movements of water, the locations of their cohorts, and the dynamics of this menagerie of objects by listening to their environment and by using the reflections of their calls.

And so as I shake the sleep from my head and listen to John briefing me on the high points of his four-hour watch, I hear in the headphones screams punctuated with low growls. The distant shadow to the south that Rachel first heard eight hours earlier is now a scarce 2.5 miles away. A chill of excitement sweeps over me. The bowheads are singing again! This is not the single utterance of a calling whale. This is a whale composing a complex cadence from its repertoire of notes placed in a deliberate, well-timed sequence. The song ends with a trill of very loud melodious notes that resonate through the water. Who would have guessed that the rotund, oil-laden bowhead could compose such a delicate combination of sounds?

We are emerging from this first chapter with stories that far exceed our expectations. And there certainly will be more stories to tell, not just from under the ice but from other difficult environments. I plan to transport these acoustic methods from the arctic to the tropics to census not whales but birds. Using a geometric pattern of properly spaced microphones I and my colleagues will be able to compose a three-dimensional acoustic panorama of a jungle habitat that is concealed from the eye. We will then be able to identify acoustically and follow many individuals of different species at the same time.

Consider, for example, South American tinamous. These birds produce a variety of calls related to territorial maintenance and mate attraction. By acoustically mapping their vocal interactions we will be able to observe many birds at the same time and learn how important their voices are in their lives. Imagine how that will increase our appreciation of avian acoustic communication! Furthermore we now have the ability to recognize different bird species by using computer-aided pattern recognition schemes. These methods open up the possibility of monitoring avian populations in remote areas using standard quantifiable techniques. These will provide us with important insights into the richness of the birds' acoustic world and will show us the dangers we impose on them and their environment through our encroachment.

The building blocks for these new methods are being developed in the bioacoustics research lab here at the Laboratory of Ornithology. By implementing an acoustic research program aimed at gathering this basic yet previously unobtainable information, we will build the foundation for intelligent and responsible conservation policies aimed at protecting habitats and the diversity of birds that are so intimately dependent on them for survival. □

Christopher Clark is director of the Laboratory's new Bioacoustics Research Program. His special interests are in the application of new technologies to conservation and censusing of endangered species. At Cornell he is working with musicians, anthropologists, psychologists, linguists, biologists, and engineers in the study of animal sound communication.

Further Reading

Bockstoce, John R. *Whales, Ice, and Men.* University of Washington Press, Seattle and London. 1986.

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SCANNING FOR OPTICS

Richard E. Bonney, Jr. and Jill Baringer

Binoculars are a bird watcher's most important tool and, like all tools, they must be matched properly to the job. Replacing the oil filter in your car is frustrating without a wrench that grips the filter snugly. And watching an elusive bird flitting through the treetops on a dark day is difficult without binoculars offering suitable magnification, clarity, and focusing ability.

Which binoculars should you choose? That's a tough question. Ask it on your next field trip and you're certain to generate a tumultuous argument. The reason: selecting binoculars is largely a matter of personal preference. We know one top-flight birder who happily uses an ancient pair of discount-store binos and swears she can't see anything through the most expensive German optics.

Nevertheless, some recommendations for birding binoculars can be made by testing several pertinent characteristics. Contributing editor Pete Dunne did just that for a *TLBQ* article in 1985 which rapidly became the most popular article we've ever published. Therefore we've decided to update Pete's fine work. If you're in the market for a new pair of binos we hope this review will help you make an informed choice.

The Process. We began by contacting 11 binocular manufacturers and asking them to lend us samples of all their models suited for birding. Immediately we were inundated with cartons of optical equipment which threatened to take over our offices. From this welter of glass we selected the models we deemed best suited for watching birds and masked their brand names and magnifications, marking them only with a randomly chosen number. We then had 27 anonymous pairs of binoculars ready for testing. Three manufacturers declined to send binoculars: Leitz, Minolta, and Swarovski.

Next, with Pete Dunne's assistance, we designed a testing ground using some highly sophisticated technology—string, fluorescent orange flagging, and eye charts obtained from a local optometrist. We set up the testing area in the Lab parking lot which, with all the string and flags, soon resembled a used car dealership.

Finally, we assembled a crew of testers consisting of

11 Lab staff members wrested away from their normal activities. The testers ranged from experienced birders to novices. We held a meeting at which we explained the testing procedures and convinced our crew that the tests wouldn't take very long. (We lied.) Then we tested.

The Criteria. We began with some quantitative tests: optical performance, field of view, minimum focusing distance, and water resistance.

Optical performance—a measure of how large and clear an image appears through binoculars—is perhaps the most important criterion. Optical performance is often erroneously assumed to be determined solely by a bino's magnification, the degree to which binoculars enlarge an image. Magnification is etched on the glasses as the first part of a two-number formula—7x35, 8x40, etc. A 7x binocular magnifies a bird 7 times, an 8x, 8 times. But greater magnification does not always result in a clearer image. Higher magnification also amplifies shaking hands and heat shimmer. Furthermore, optical performance is heavily influenced by lens quality, so that high-magnification binoculars with poor optics may be almost worthless.

We measured optical performance as the smallest letters on our eye charts that could be read clearly at varying distances. Note that 7x and 8x binoculars often outcompeted 9x and 10x binoculars in this category.

Field of view—the amount of area visible through a stationary glass—is also important. The more area that you can see at one time, the easier it is to scan the horizon or examine several birds in a flock. Many birders assume that this criterion is measured by the second number in the two-number formula. Wrong. That number simply is the diameter of the objective lens—the lens farthest from your eye—in millimeters. Field of view is determined by the internal design of the binocular, and it's possible for a wide angle 7x35 to have a greater field of view than a 7x50. We measured field of view as the number of flags spaced two feet apart that could be seen at a distance of 250 feet.

Minimum focusing distance is important when viewing birds at close range as in the woods or a garden. It is very frustrating to have a confusing bird alight far enough away so that you need your binos but too close to focus. We measured minimum focusing distance as the closest distance from an eye chart at which the binoculars could be clearly focused. Some models focus as close as a few feet.

Water resistance is a criterion you'll forget about until the first time you get caught in a thunderstorm. Binoculars should keep the moisture out and not fog up. We tested water resistance by placing all the binoculars under a lawn sprinkler until soaked, shaking off the water, and stacking them in a refrigerator for two hours so that any moisture that may have leaked inside could condense. Several of the binos, including some of the higher ranking ones, did poorly in this category.

We also subjected the binoculars to a barrage of qualitative tests—play of focus and smoothness of focus; weight; comfort, feel, and handling; and quality and workmanship.

Focus. The ability to focus quickly and easily is essential. All but one of the binoculars we tested have a center wheel that focuses both barrels at once and an individual adjustment for the right eyepiece to compensate for differences in strength between an individual's eyes. We discovered lots of variation in the smoothness of focusing, however. Some wheels turned easily, others felt as though they were full of sand or grit. We also discovered much variation in the focus play—the amount that the wheel needed to be turned to bring an image into focus. The highest rated binoculars in these categories had focus wheels that turned easily but not too easily and that brought images into focus quickly but not so quickly that they sacrificed depth of field.

Weight. In general, the lighter the binocular, the more comfortable it is to carry and the less fatigue it causes when held to the eye. Therefore, this category usually assigns highest marks to the lightest binoculars. How heavy a binocular feels to its user is also dependent on design, however, so the correlation between actual weight and ranking in this category is not perfect. For the curious, actual weights are included on our rating chart.

Comfort. Now here's a subjective category. It measures how well the binoculars fit the tester's hands; how the binos feel while they're being operated; whether the eyepieces fit comfortably into the user's eye sockets, and whether the focus knob is easy to reach and operate.

Quality. Finally, we ranked the binoculars on their apparent quality and workmanship, asking the question, "Do these binoculars look as though they'll stand the test of time?" Almost every pair tested did well in this category.

An additional column on our chart indicates the style of each binocular—roof prism or porro prism. The traditional porro prisms are bulky, with offset barrels and an external focusing mechanism. Roof prisms, which have straight barrels and internal focusing, are generally lighter, slimmer, more comfortable to grip and hold steady, more waterproof, and more expensive.

One last consideration: eyeglass wearers have a special problem. Eyeglasses increase the distance between the eye and the ocular lens—the lens you look through—thereby causing a drastic reduction in the field of view. All the binoculars we tested come with rubber eyecups that eyeglass wearers can roll down to bring their eyes closer to the lenses. A few of the roll-down cups don't work well, however, and we've noted these under "disadvantages."

The Results. After a fortnight of testing, which was continually thwarted by April snow and May rain, we were ready to compile the voluminous data into the

Field of view, weight, play of focus, price—there's more to choosing the right pair of binoculars than peering through the end that makes the world look big. Laboratory staff test the leading brands and separate the blur from the perspicuous.

Brand and Model	Overall Rating	Suggested Retail Price	Roof prism Porro prism	Optical Performance	Field of View	Minimum Focusing Distance	Water Resistance	Smoothness of Focus	Play in Focus	Weight	Comfort Feel Handling	Quality and Workmanship	Advantages	Disadvantages	Actual Weight oz.
Zeiss Dialyt 7×42 B/GA T CF	1	$1,030	RP-A	2	1	1	+	2	1	3	1	1	1		26.5
Nikon 8×40 DCF Classic Eagle	1	1,107	RP	1	1	2	+	3	2	3	1	1			29.0
Bausch & Lomb Elite 8×42	1	1,190	RP	2	1	1	+	4	1	3	1	1		A	28.0
Nikon 9×30 DCF Execulite	2	540	RP	2	3	2	√	1	1	1	2	1	2, 3	B, C	17.0
Zeiss Dialyt 10×40 B/GA T CF	2	1,085	RP-A	2	2	4*	+	2	3	2	1	1			29.0
Swift Audubon 8.5×44 BWCF	2	318	PP	1	1	2	–	1	1	3	3	2	3	D	29.5
Mirador ACC 8400 8×40	2	306	PP	3	2	2	+	3	1	2	2	2	4	E, H	23.5
Bausch & Lomb Custom 8×36	2	314	PP	2	2	1	–	1	3	1	2	2		E, H	22.5
Bausch & Lomb Custom 10×40	2	334	PP	1	4	2	–	1	2	2	2	2		E, H	26.5
Brunton 7×42 Model 4055N	3	363	RP	4	2	3	+	2	2	2	1	2		A	24.0
Swift Armored Trilyte 8×40 HCF	3	255	RP-A	4	3	5	√	1	2	1	1	2		A, B, F	22.0
aus Jena 10×40 B Notarem	3	500	RP	2	4	4	+	5	3	2	1	2		G	23.0
aus Jena 8×50 B Octarem	3	580	PP	2	1	2	+	4	2	5	4	2	1	D	37.5
Swift Heron 8×40 BWCF	3	125	PP	2	2	2	–	1	2	3	4	3		C, I	25.5
Mirador YCC 1050 10×50	4	297	PP	2	5	5	–	3	2	2	2	2	4	E, H	27.0
Swift Neptune 7×35 BCF	4	235	PP	4	1	3	√	2	1	1	2	2		J, K	22.0
Bausch & Lomb Birder 7×35	4	66	PP	3	3	2	√	4	5	2	2	3	3		19.0
Jason 7×35 PermaFocus 2000	4	110	PP	4	3	5	√	N/A	N/A	1	2	4		C, K, L	19.0
Mirador YCC 7420 7×42	4	252	PP	4	2	4	√	5	2	1	3	3	4	E, H	21.5
Nikon 8×35 Eaglescout	4	281	PP	3	2	3	√	5	4	2	5	2	4	C, H	23.0
Mirador BCF 7350 7×35	4	126	PP	4	1	3	–	5	4	2	4	2		K	23.0
Jason Model 114 All Weather 7×50	5	130	PP-A	2	2	4	+	4†	4	4	4	3		D, H, I, K	31.0
Jason Model 141 All Weather 10×50	5	132	PP-A	4	4	5	–	4†	5	4	4	3		D, H, I	30.5
Compact Models															
Bausch & Lomb Custom Compact 7×26	1	294	PP	3	1	1	√	1	1	N/A	2	1	3, 5		11.5
Nikon 9×25 CFHP Travelite II	3	140	PP	2	5	3	–	4	3	N/A	2	2		C, M	11.0
Jason Model 117 All Weather 8×21	4	130	RP-A	3	3	2	–	3	3	N/A	3	3	1	B, C, K	9.0
Brunton 10×24 Model 4050	5	182	RP-A	5	5	4	√	3	4	N/A	2	3	1	B, C, K	11.0

1–Excellent
2–Very Good
3–Good
4–Fair
5–Poor

+ no fogging
√ partial fogging
– severe fogging

*** Factory modified for close focus**
† Instafocus
A Armored

Key to Advantages

1. Objective lens deeply recessed for protection.
2. Light and compact.
3. Rated as best buys.
4. Wide, convenient focus wheel.
5. Very bright for compact.

Key to Disadvantages

A. Focus knob poorly positioned.
B. Image a bit dark.
C. May not work well for eyeglass wearers.
D. Large and bulky.
E. Rubber eyecups awkwardly long, causing reduced field of view for some users.
F. Neck strap attachment awkward.
G. Right eye adjustment, located next to focus wheel, prone to slipping.
H. May not adjust for narrowly spaced eyes.
I. Eyecups may dig into eyes.
J. Image somewhat distorted.
K. Tendency to cause eyestrain.
L. No focus adjustment, cannot be used at distances closer than 40 feet.
M. Edge of field blurry.

chart that appears above. With information on suggested retail price and individual and overall ratings, the chart should be a helpful guide as you choose a pair of binoculars that will meet your needs.

WARNING: The overall ratings should be used only as a guide for two reasons. First, for purposes of compilation, we gave equal weight to each test—for example, optical performance and eye comfort. You, however, may feel that one or the other is much more important. Second, the differences between binoculars that are adjacent on the chart are often very slight, especially among the top-rated models. Third, binocular preferences are indisputably subjective. A few testers disliked some binoculars that came out near the top of the list; conversely, there are binos near the bottom of the list that one or two individuals thought were terrific. So if you can, test binoculars before purchasing. One good way to examine lots of models is to go on a birding field trip and pester your comrades for looks. Testing is especially important for eyeglass wearers!

A few models deserve special mention. The top-rated Zeiss 7x42 is a marvel. As one tester put it, "Looking through these binoculars is like having a little light bulb illuminate a perfect image." If you have the money, you can't go wrong with these.

The Nikon 9x30 Execulite is a beauty at half the price of the Zeiss. It's also half the size. If you want a superb binocular but don't want to break the bank, this model may be for you. Some testers found it too small for comfort, however.

The Swift Audubon 8.5x44 is a terrific binocular at a terrific price. We rate it as the best buy. Drawbacks: it's heavy and bulky—that's what happens when you put power and wide field into porro prisms—and it failed the water resistance test. Perhaps Swift can work on this problem. (Note: this model is a redesign of the Audubon model that was tested, and fared poorly, in the 1985 test.)

The Bausch and Lomb Birder 7x35 is an excellent budget binocular. It outperformed several binos at twice the price and is a great choice for a beginner.

Finally, the Bausch and Lomb Custom Compact 7x26 is a mini-wonder. It outperformed several full-sized binoculars yet weighs just 11 ounces and can fit in a pocket. The other compacts we tested pale by comparison.

You should be able to find a pair of binoculars on this list that will suit your needs. Good luck! □

Rick Bonney is managing editor of *The Living Bird Quarterly*; Jill Baringer is manager of the Laboratory's *Crow's Nest Bookshop*.

Further Reading
Connor, Jack. *The Complete Birder.* Houghton Mifflin Co., Boston. 1988. See chapter, "Optics."
Dunne, Pete. "Binoculars for Birders." *The Living Bird Quarterly.* Winter 1985.

BHL

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FEATHER MAGIC

Photographs by Frans Lanting

Feathers are amazing. They're strong—ounce for ounce, they're among the most durable substances on Earth. They're beautiful—they come in a vast array of colors, sizes, and shapes. And they're unique to birds. In fact, possession of feathers is a safe definition of the term "bird."

Like the scales on a bird's feet and the horny sheath of the bill, feathers are outgrowths of the animal's skin. But ornithologists disagree about how feathers originally developed. Many believe that they evolved from reptilian scales, but whether early feathers served as insulation or a means of primitive, gliding flight is unknown.

Either way, feathers now play many roles in a bird's life. They preserve body heat, provide waterproofing, and protect the tender skin against injuries. Their shapes, colors, and iridescences are important in camouflage, courtship, and territorial battles. And they make possible the bird's tremendously well-developed power of flight.

Yet feathers are not indestructible. Once fully formed, they are dead. They get no nourishment from the bird's underlying skin and cannot be repaired if worn or damaged. Therefore they must be replaced at least once each year by the process of molting, which costs the owner dearly in terms of energy. Most species lose just a few feathers at a time so the birds can go about their business undisturbed.

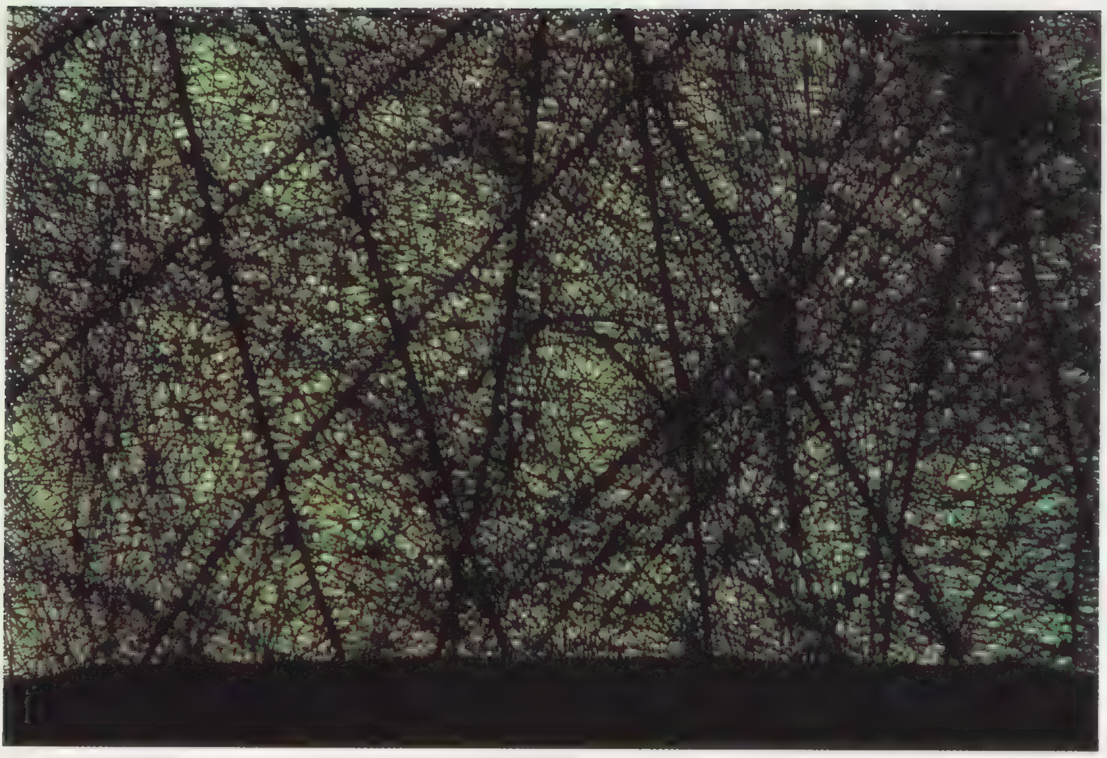
On these pages, gaze at some gorgeous photos of feathers and read some interesting (if sometimes obscure) facts about their origin, evolution, and function. □

Shifting the angle of light incidence is another way of changing the traveling distance, and with it the phase difference, of that part of the light that has to go through the film and back to the upper surface. With every change of the optical distance a different color appears, and this is the phenomenon known as iridescence. Common occurrences of iridescence in our daily lives are soap bubbles, with their rapidly changing, gleaming, pure colors, and the familiar oil slick on a wet street. Both are classic examples of the "colors of thin films."
The Splendor of Iridescence: Structural Colors in the Animal World. *Hilda Simon. Dodd, Mead & Company, New York. 1971.*

King bird of paradise: tail feathers

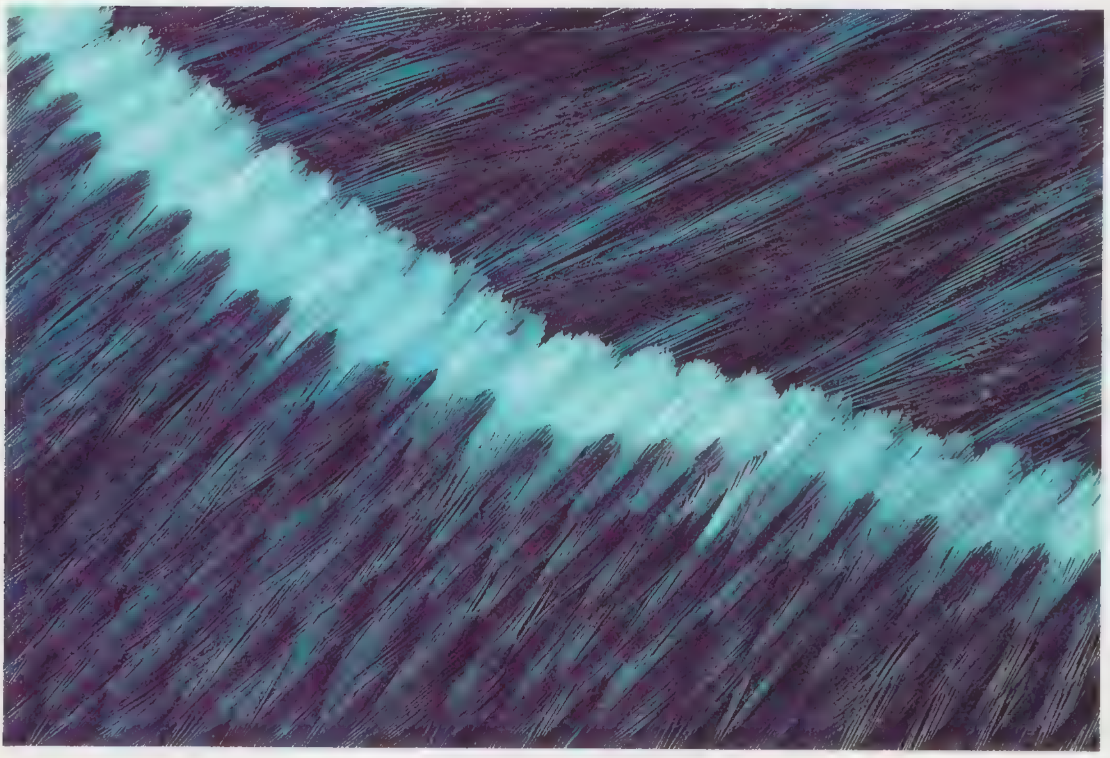
Resplendent quetzal: detail of rump plumage

Detail of down feathers



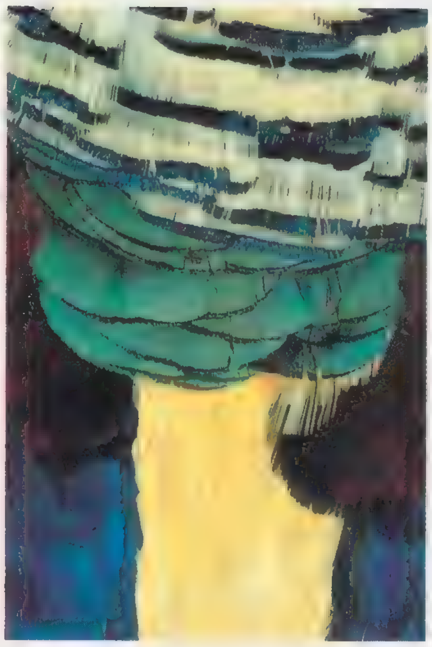
Once pennaceous feathers evolved as a heat shield in facultative homoiothermic protobirds, these structures reached a preadapted stage and could serve as an insulating covering to prevent heat flow out of the body of an obligatory homoiotherm. And when the feathers were well developed, with a central shaft and vane formed by interlocking barbs, the feathers reached a second preadapted stage—structures that could enlarge the airfoil of the wings and the tail.
The Origin of Birds and the Evolution of Flight. *Edited by Kevin Padian. California Academy of Sciences, San Francisco. 1986.*

Little penguin: flippers and rump plumage



The plumage of penguins is unusual in structure compared to other birds and is rather like fur in superficial appearance. The feathers are narrow, short (maximum length about 4.5 cm in the Emperor penguin), the central axis is solid, and their distribution is dense (11–12/cm²). According to Drent and Stonehouse (1971), based on temperature gradients between the skin and core, when the bird is in air the feathers account for 80 percent of the insulation and the rest is due to the blubber.
The Biology of Penguins. *Edited by Bernard Stonehouse. University Park Press, Baltimore, Maryland. 1975.*

Golden pheasant: back feathers



To be sure, feathers are important in avian courtship displays and thus in choosing mates. But the evolution of almost any structure can be explained as due to sexual selection, and I agree with Philip Regal that "sexual selection as a general evolutionary force, used to explain miscellaneous conditions that are difficult to account for, is unsatisfying."
The Age of Birds. *Alan Feduccia. Harvard University Press, Cambridge, Massachusetts. 1980.*

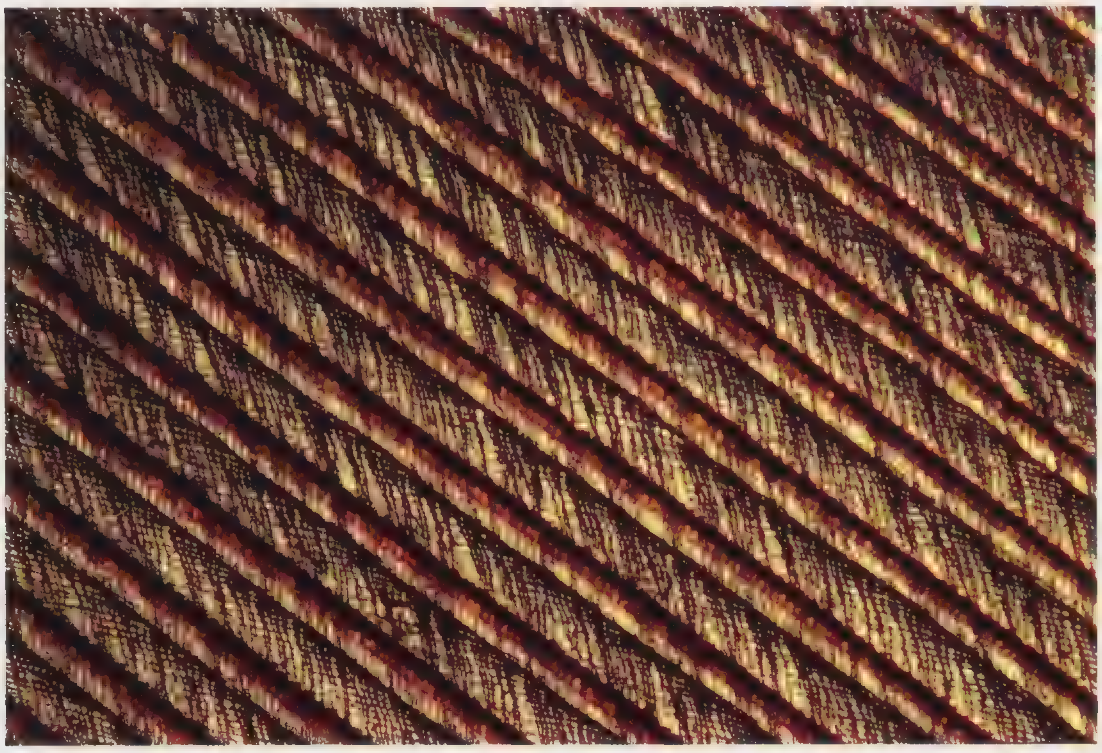
Germain's peacock-pheasant: back feathers

Great argus: back and wing feathers

In 1907, Baron Francis Nopcsa, in an article "Ideas on the Origin of Flight," published in the Proceedings of the Zoological Society of London, *proposed that the development of flight came from ground-running, long-tailed bipedal reptiles, which flapped their forelimbs as they ran rapidly over the ground.*
How Birds Fly. *John K. Terres. Harper & Row, New York. 1986.*

Blue bird of paradise: tail plumes

Nothing is known about the origin of feathers. The often-repeated theory that feathers are nothing more than modified scales may seem plausible at first but has been more or less discarded by modern zoologists. Feathers are such marvelously complex structures, light and flexible but extremely strong, that, scientifically speaking, to have to picture "modification" of reptile scales into feathers is scarcely less difficult than to imagine that feathers evolved independently.
The Splendor of Iridescence. *Hilda Simon.*



Barn owl: detail of flight feather

The air, like any fluid, has weight, and it presses against every surface of anything submerged in it—downward from above, upward from below, and inward from all sides. At sea level the air presses on all surfaces with a force of 14.7 pounds per square inch. The air therefore will supply the force to support flight, provided the flying object can somehow reduce the pressure on its upper surface to less than the lifting pressure, and decrease the pressure against its front surface or increase that from behind.
"Bird Aerodynamics." John H. Storer. Scientific American. *April 1952.*

Eurasian jay: display patch on wing

Encounter with a Pumper

Christian Autotte

An afternoon in May. Before me is a row of low shrubs lining a ditch, beyond a field stretching into the distance, ending in a patchwork of small woodlots. Behind, a forest showing the tender green leaves of early summer. And right above is the bright sun, beating hard on my canvas blind.

For the past few hours I've been trying to photograph a northern oriole. He has been seen for two consecutive days perched atop a dead branch and singing his heart out. I've set up my blind in front of the branch and presently I am simmering in my brown box, waiting for a bird who refuses to cooperate. Even the song of its species played back on a tape recorder has failed to coax him onto that branch. Once or twice he came by, eyeballing the blind from a safe distance, out of reach of my lens. He is nagging me.

Hiding in his sweatbox, Christian Autotte never expected to hear the American bittern's Gloup, gloup, gloup, Oonk KA-lunk, oonk KA-lunk, oonk KA-lunk.

As the minutes turn into hours and the hours pass, it seems increasingly likely that it will be an unproductive day. At times like these photographers are pulled in two different directions: give up and go home or just wait and see.

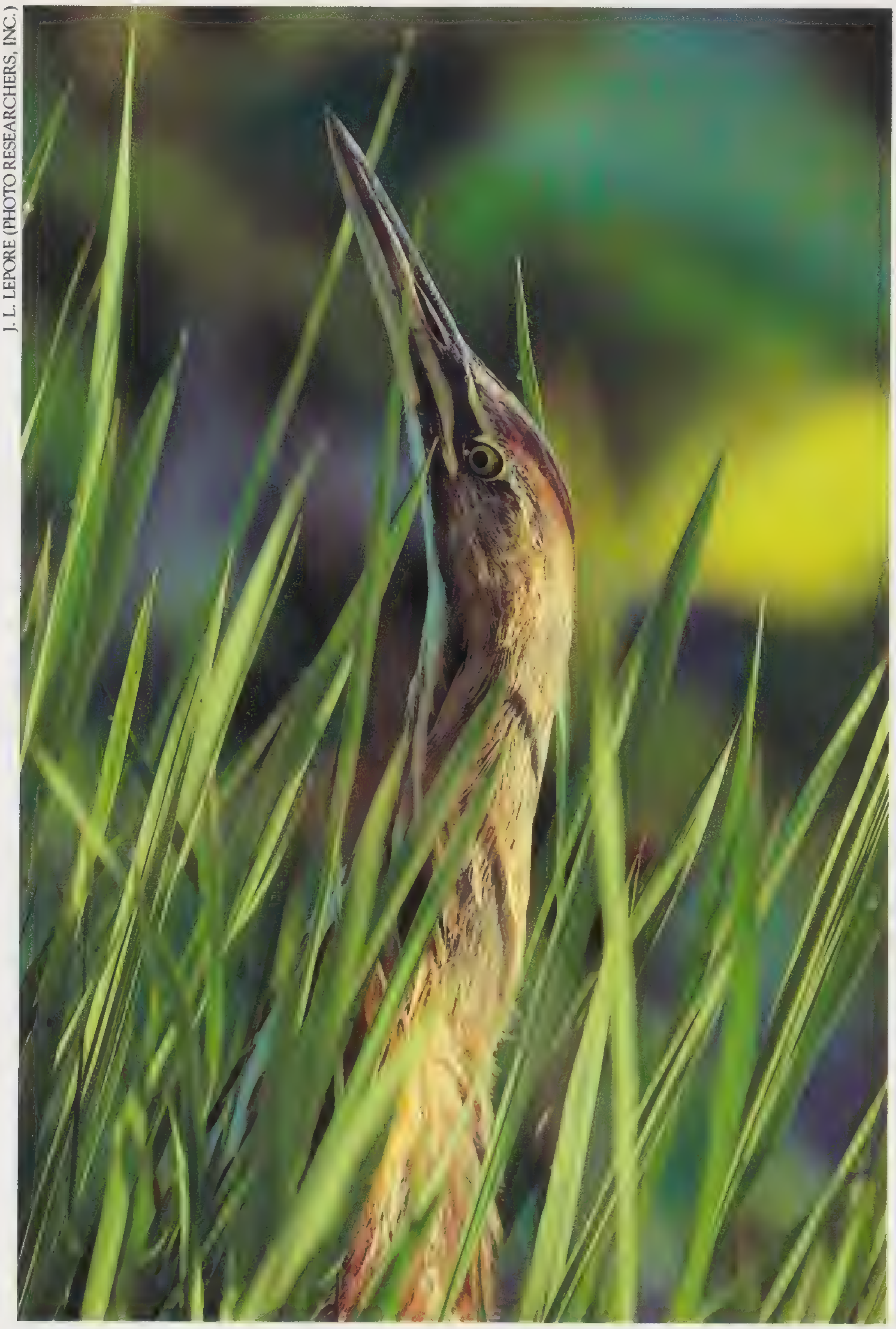
I'm still trying to figure out what to do when a flurry of wingbeats decides for me. Judging from the sound what has landed outside my blind is no songbird. I move left and right looking for the peephole that would allow me to see something, but bushes and tall dry grass do a good job at hiding everything.

That's when I hear it, the bird call you need to hear only once to remember for the rest of your life. The American bittern.

How could a living being evolve such a ridiculous way of calling for a mate? It's almost as bad as "Hey baby, what's your sign?" Crows caw, sparrows chirp, swallows chatter, geese honk, ducks quack, and most other birds sing a tune or two. But the bittern claps and belches like an old engine. To put to paper the sounds produced by this bird makes me feel like a comic strip writer: *Gloup gloup gloup. Oonk KA-lunk, oonk KA-lunk, oonk KA-lunk.* The bird can't be confused with anything else, dead or alive.

The loud noise—you can hardly call it a song—sends me fumbling with the tape recorder. In my fruitless attempts to attract the oriole I've been using a commercial recording that also includes bittern calls. Fast forward. Play. I forget to lower the volume. Before I can hit the pause button the woman on the tape is yelling out "THE EASTERN MEADOWLARK." Mumbling some well-chosen curses, I listen for signs that the bittern is ready to flee this noisy neighborhood, but there is no sound. The peepholes still reveal nothing more than bushes and dry grass. Short of

LEFT: DARRELL GULIN RIGHT: TOM & PAT LEESON



J. L. LEPORE (PHOTO RESEARCHERS, INC.)

THE ELUSIVE DUNK-A-DOO

The bittern's peculiar call has given rise to a few colorful nicknames. When heard from a distance the sound has been compared to that of a mallet driving a stake in wet ground, hence the name "stake driver." French-Canadians judge the sound to be reminiscent of antique hand-operated water pumps, so the bittern is sometimes called *l'oiseau pompe-à-eau*, "the water pump bird," or simply *le pompeux*, "the pumper." The loudness of the call also brought about "thunder pumper," while others simply use a literal translation of the sound and call the bird a "dunk-a-doo."

Back in Europe, bitterns of a different species are also notorious for their calls. Their "booming," similar to the bellowing of bulls, inspired naturalists to give them the scientific name of *Botaurus*, from *Bos*, ox, and *Taurus*, bull. It's a name shared by our own American bittern, *Botaurus lentiginosus*.

To make his booming sound a male bittern draws air into his esophagus, making the throat bulge and act as a resonating chamber. Air coming in and out of the gullet is what produces the sounds, without help from the vocal cords, which are used only in producing a guttural "kok kok kok" emitted by birds forced to take off. To withstand the strain, the male's esophagus thickens during the breeding season.

In the southern part of their range, which covers virtually all of North America south of the tundra, bitterns begin calling as early as February; up north they're heard from April until early July. Although they are heard mostly at dawn or dusk, bitterns can call any time. Their vocalizations are a prelude to more subdued mating rituals. Once he has attracted a mate, a male will walk bent over before her, then both birds will engage in simulated fights before mating.

The female builds a ground nest of reeds, sedges, or cattails, in which she lays 4 to 6 eggs. Brooding takes 24 to 29 days and begins with the first egg laid. Built in tall vegetation, nests are very well hidden, with two paths leading to and away from them. Females land at a distance and walk to their nest; they leave by a different path. This makes it very difficult to locate the nests.

Bitterns are masters of camouflage. When surprised in their habitat of cattails and reeds they draw in their plumage and slowly point their beaks skyward, becoming almost impossible to distinguish from the surrounding vegetation. Some will even sway in the blowing reeds.—C. A.

JOHN LIDINGTON (PHOTO RESEARCHERS, INC.)

A bird of many poses: pointing its beak skyward, the bittern virtually disappears among the cattails, far left. In moments of excitation it exposes its pompoms as a threatening gesture, below, but when fishing at the water's edge it crouches low and does not seem at all imposing.

breath and heart beating fast, I lower the volume and resume my search for the right call. Soon it fills the air with the expected results: movement to my left. I finally see the bird coming into view. Crouching low with head down, he doesn't seem very imposing. He walks cautiously, attentive to every detail, seemingly fighting the turmoil of two opposite and powerful instincts: defense of territory from an invader and self-preservation from the unknown danger represented by the blind.

Satisfied that my sweatbox presents no immediate danger, the bird soon repeats his call. Now that's something to see! Lowering his head, he snaps his bill a few times—*gloup gloup gloup*—and then with violent convulsions he gulps a beak full of air, filling his crop and throat before belching out *oonk KA-lunk, oonk KA-lunk, oonk KA-lunk.* The scene is so unusual and funny that I can't help chuckling to myself.

Wanting to keep the bird as close to the blind as possible, I quickly turn on my taped bittern again. It catches the real bird's attention: he stops pacing, raises his head high, and stands tall to look for the phantom bittern. I quickly shoot a few pictures, even though something is marring the bird's looks—two conspicuous tufts of white feathers protruding from the shoulders. There in the blind I think that I'm dealing with an unkempt bird, a slob who can't keep his plumage in order. Only after subsequent reading do I realize that the "pompoms" were signs of excitement, a threatening gesture aimed at the invisible opponent.

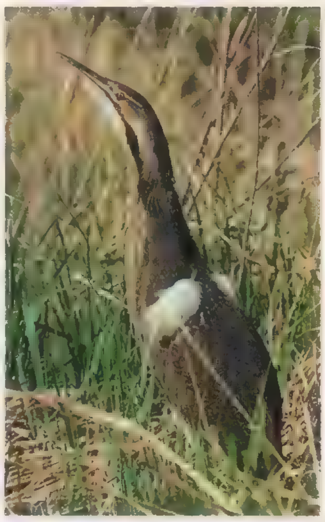
With the poise common to all members of the heron family, the bird resumes his slow walk around the blind and slips through the bushes, down in the ditch and out of sight. Once again the recording brings him back and he answers. Unfortunately, both times he calls from a tangle of bushes, making it impossible to take good photographs.

He walks around the blind a second time, giving me a few more shots, then slips back into the ditch. This time the tape fails to bring him back. Like so many birds, bitterns lose interest in tape recordings when they can't find their opponent.

The sun sinks behind the forest and shadows creep toward the blind. In silence I get out and pick up my gear, then walk away. In the distance I hear a northern oriole. □

Christian Autotte is a freelance wildlife photographer based in Montreal, Quebec. He is a regular contributor to The Young Naturalist Foundation, The Canadian Nature Federation, and The Cousteau Society.

Though it may sound like a neat trick to bird watchers and photographers, the playback of recorded bird calls should be used with caution. While some birds show little or no response, others become overexcited to the point of being disrupted in their normal behavior patterns. This is particularly true of birds with very high metabolic rates, such as most songbirds. Playbacks should be discarded as soon as the birds show signs of becoming frantic, especially if young are being reared. In many cases, playback of a single song will net the desired response. The best a photographer can hope for with this technique is a few good shots of singing birds, and it requires a good deal of experience, knowledge of the birds' behavior, and common sense.—C. A.



C. AUTOTTE

Update: Spotted Owl

Since the spotted owl's troubles were last reported in these pages ("Cool Spots in Hot Debates," Winter 1986), the problems facing the species in the Pacific Northwest seem only to have increased. In the last 20 months:

- the U.S. Fish and Wildlife Service (USFWS) has announced its decision to leave the bird off the federal endangered species list;
- the U.S. Forest Service has released plans calling for continued cutting of the virgin forests on which the owl depends for protection, food, and nests;
- the Federal Bureau of Land Management has announced its refusal to reconsider timber management plans for the spotted owl localities it controls in Oregon;
- fires have damaged 800,000 acres of forest in Washington, Oregon, and northern California;
- and the owl's nesting record has varied from mediocre (in California and southern Oregon) to abysmal (in northern Oregon and western Washington).

The northern spotted owl now numbers about 600 pairs in Washington, about 1,200 pairs in Oregon, and about 500 pairs in northern California. Throughout its range the bird is closely associated with old-growth forest. These virgin tracts of Douglas fir, western hemlock, red cedar, bigleaf maple, and other trees are beautiful, tall, and centuries old—some individual Douglas firs are a thousand years old. But these trees are also valuable timber, so protection of the spotted owl conflicts with the interests of the lumber industry, especially in the national forests.

Although some pairs of spotted owls live in the five national parks of the Pacific Northwest, where trees are protected, most of the remaining pairs live in the national forests and other federally owned lands of Washington, Oregon, and northern California. In fact, at least two-thirds of the remaining spotted owl habitat in the Pacific Northwest is outside the national parks. Eighty percent of these trees are available for lumbering, and 500-year-old firs and 8-foot-diameter cedars are cut down regularly. In 1987 old-growth forest on federal land in the three states was clearcut—sawed down to stumps—at an estimated rate of 170 acres a day.

The Forest Service intends to continue to allow lumber companies to cut the publicly owned trees in the Northwest. In fact, the service's recent draft management plans for the national forests in the Pacific Northwest actually call for an accelerated rate of clearcutting, according to analysis by The Wilderness Society. Interpretations of this plan differ because of varying estimates of how much old growth remains, but George T. Frampton, Jr., president of The Wilderness Society, has charged that the draft plans are "a prescription for disaster." And he adds, "Amazingly, our analysis of the Forest Service's data shows that in many cases there is already much less old growth remaining than the agency claims will be around after another 50 years of logging."

In the Mt. Baker–Snoqualmie National Forest, for example, the Forest Service estimates there will be 500,000 acres of virgin old growth remaining if lumber companies are allowed to cut at the newly proposed rates for half a century. But The Wilderness Society estimates there are only 300,000 acres of virgin forest standing there now.

> **"Our arguments for protection of old-growth forests are so good for so many other reasons—economic, aesthetic, historic, recreational—we just don't want to hang the whole thing on the fluffy brown shoulders of a single bird."**

Clearcutting of these forests affects spotted owls both directly and indirectly. Obviously, the fewer trees, the fewer snags and cavities are available for roosting and nesting. Fragmentation of the forest, breaking large, uniform tracts into smaller, disconnected sections, also seems to have other adverse effects. Barred owls, a closely related species with more flexible nesting and feeding habits, are more tolerant of fragmentation and are increasing in the area. They may be competing with spotteds for prey and nest sites. Predation of spotted owl young by great horned owls is also a significant cause of mortality, and fragmentation probably increases the great horned owls' access to spotted owls' nests.

In parts of its range, the spotted's prey base also may be threatened. The populations in northern Oregon and Washington seem to be having special difficulties because their primary food source is flying squirrels, which are apparently less available than the wood rats the owls in southern Oregon and northern California can feed upon. If the flying squirrel population is declining, the cause may be forest fragmentation. The squirrel also requires cavities for nesting, and one of its food sources is the fungi which grow on the tree roots in the heavily shaded floors of old-growth forests.

Harriet Allen, spotted owl project leader for the Washington (State) Department of Wildlife, has been studying the spotted owl for six years in the Cascade Mountains and on the Olympic Peninsula. "We haven't had a good nesting season in Washington," she says, "since 1983. It's very difficult to monitor the state's entire population. Since spotteds generally don't nest every year, their nests are especially hard

NICK BERGKESSEL (PHOTO RESEARCHERS, INC.)

to find. But in the spring and summer of 1987 the Forest Service and National Park Service monitored 40 spotted owl sites on the Olympic Peninsula. Only three pairs found in those sites fledged young."

"One of those pairs raised two young," adds Eric Forsman, wildlife biologist for the Forest Service in Olympia, "but later that year both died under suspicious circumstances. They were found with their skulls bashed in, apparently by a large solid object."

Forsman has been studying spotted owls since 1968, when he began investigating them as a student at Oregon State University. Today he may be the world's leading authority on the spotted owl. "I started out just wanting to see one, and it snowballed from there. Back then, very little was known about them. Today I'd say the spotted owl is the best known owl in North America. Because of the politics, a lot of researchers are interested, and we have a very detailed record of prey preferences, seasonal changes in diet, nesting needs, seasonal movements. And the data indicate a population on the decline."

DOUG PLUMMER (2)

Above, color-banded spotted owl in flight, Oregon coast range. Below right, radio transmitter used to track spotted owls. Below left, flying squirrel, main prey of spotted owls in northern Oregon and Washington. Even with all the research done on the owl, its numbers continue to decline.

Because its protection creates conflicts with industry, the spotted owl has been called the "winged snail darter." The snail darter is the tiny member of the perch family whose apparently endangered status held up the construction of the $137-million Tellico Dam on the Little Tennessee River until 1979 when Congress granted a special exemption of the Endangered Species Act to the Tennessee Valley Authority so that it could finish the project. At the time the snail darter was believed to exist only at the dam site. It was later discovered at other sites, and in 1983 the USFWS removed it from its list of endangered species.

Comparing the spotted owl to the snail darter suggests that arguments for protecting the bird are much ado about nothing. But some experts believe it is more accurate to compare the spotted owl to the ivory-billed woodpecker.

"The spotted owl is the ivorybill of the West," says David Wilcove, senior ecologist for The Wilderness Society and one of the organization's spokesmen on spotted owl management and preservation of the old-growth forest in the Pacific Northwest.

"In many ways the two species are very similar. Both are obligate inhabitants of old-growth forests, unable to survive in second growth, and so their interests are in direct conflict with those members of the timber industry who want to make short-term profits by cutting virgin trees."

Like the ivorybill, the spotted owl is a nonmigratory, relatively sedentary bird that nests in tree cavities and needs enormous tracts of old-growth forests to survive. Spotted owls require an estimated 1,000 acres of old-growth forest per pair in California, up to an estimated 3,800 acres per pair in Washington. By comparison, great horned owls need about 150 acres per pair; bald eagles about 500 acres.

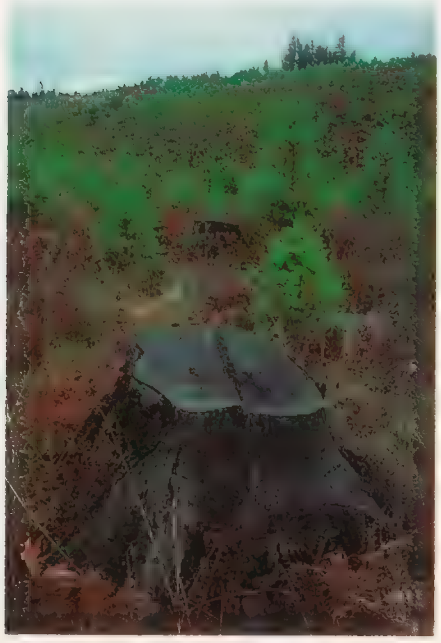
Despite the spotted owl's troubled status, many conservation groups were reluctant to ask the USFWS to consider listing it as an endangered species. They felt this would lead to a repetition of the snail darter controversy where the

arguments against destruction of natural habitat were confused with arguments based solely on the idea that any endangered species should be preserved.

Says Wilcove, "Our arguments for protection of old-growth forests are so good for so many other reasons—economic, aesthetic, historic, recreational—we just don't want to hang the whole thing on the fluffy brown shoulders of a single bird."

Few people remember today that as late as January 1979, the Congressional Endangered Species Committee voted against further construction of the Tellico Dam not for environmental but largely for economic reasons. The committee's staff study had shown that the costs of finishing construction or tearing down the dam and restoring the original river habitat were about equal, though the dam was by then almost completed. As it turned out, the snail darter survived the construction of the Tellico Dam. The wildlife habitat on the Little Tennessee River, however, was irreparably damaged. Whether the local economy benefited in the long run is still an open question.

The reason for the spotted owl's decline is simple: the bird thrives only in old-growth forests, and the U.S. is losing 60,000 acres of old growth each year. Right, tree marked for cutting on the Oregon coast.



DOUG PLUMMER (2)

Old-growth forests are such complicated ecosystems and so slow to develop that many foresters believe once cut they will never return. The Douglas firs must appear first and grow undisturbed for 150 years to create enough cover to shade out second-generation firs and thus enable cedars, hemlocks, and maples to grow. These trees too must grow undisturbed for decades to create the ecosystem. And nurse trees, dead trees that are allowed to rot where they fall and so support the root systems of younger trees, are still another component in the complex. In 1984 The Society of American Foresters released a report that concluded: "[There] is no evidence that old-growth conditions can be reproduced silviculturally. In fact, the question is essentially moot, as it would take 200 years or more to find an answer. Old-growth management for the foreseeable future will be predicated on preservation of existing old-growth stands."

Therefore advocates for the preservation of old-growth forest see the protection of this unique habitat as an even larger issue than that of the spotted owl. Nevertheless, after the USFWS finally did analyze the spotted owl's status and declined to list it, many conservationists were outraged.

"If the U.S. Fish and Wildlife Service had been in charge of the Titanic," says Wilcove, "my guess is they wouldn't have lowered the lifeboats until the ship was under water.

"The lesson we don't seem to have learned, whether it's been the ivory-billed woodpecker, the dusky seaside sparrow, the least Bell's vireo, or the California condor, is that the time to take strong action is *before* a species lands in the critical care ward.

"The spotted owl is very close to critical care already. The longer we wait the smaller the population becomes, and so the more difficult it will be to develop a management plan to save the species. The population is already so stressed that, even given the amount of old growth still standing today, it is hard to design a management plan to save it. In five more years, it will be many times more difficult still. We lose 60,000 acres of old growth a year. In 20 more years, given the way things are going, it probably will be impossible to save the spotted owl."

—Jack Connor

Broad-winged Hawks

We woke early and looked out the window to check the weather. Our hopes soared. The high pressure system was holding—not a cloud in the sky, and the wind was light and out of the northwest. We had to make a decision, the perennial decision of hawk watchers. On this September Monday, should we skip work and head for the mountain?

The day before 5,083 hawks had passed over Mt. Wachusett, Massachusetts, the hawk watching site near us. This was considered a high daily number, and we wondered if more hawks were going to be streaming overhead on their migration, or had yesterday been the big day of the season? It took us only a moment to decide. One thing we had learned in our years of hawk watching was that if the weather is even remotely favorable, and the date is between September 10 and 20, you do not hesitate, you go!

As our car climbed the mountain and we got our first glimpse of the top, we knew we had made the right decision. The few hawk watchers had their binoculars pointing skyward, meaning they had already spotted hawks. We jumped out of the car and joined the others on the stone parapet.

"Large kettle over Monadnock," someone was saying. As we spotted the group, or kettle, of rising hawks and began to scan the sky, we saw that this wasn't just a large kettle, it was an avalanche! The sky was filled with hawks as far as we could see. We stood transfixed, filled with elation and awe at the rivers of birds overhead. Then we realized the difficulty of our task—counting the hawks. Only a handful of hawk watchers was present, but it included experienced observers and a skilled site leader. We organized ourselves into small groups and divided the sky into manageable areas.

For the next 8 hours we were treated to the hawk watching spectacle of our lives. From 11 a.m. to noon 4,541 hawks soared overhead. By the end of the day, we estimated that 17,517 hawks had streamed over Mt. Wachusett. Of that number, 17,415 were broad-winged hawks.

The best place to see broad-winged hawks is from one of the inland hawk watching sites in eastern North America during September. Broadwings migrate in large numbers during this time. They ride the thermals, an energy-efficient way to make their long journey to South America where most of them winter. Broadwings eat amphibians and reptiles, a food source unavailable in winter, which is why most of them leave the continent.

Because they cluster in thermal updrafts, broadwings are easily seen, especially from sites associated with mountain updrafts and thermals. Groups of broadwings are referred to as "kettles" and look like an upward rising, living mobile of birds. Most other species of migrating hawks fly in a more dispersed manner and do not kettle in such large numbers.

On their breeding grounds broadwings are much less conspicuous. Each spring, male and female migrate to the forests where they bred in previous years. They will defend their territory against other hawks by soaring above them, giving their *sigeeee* call, and diving at them. But attacks are rare and in general the broadwings do not interact with other hawks.

Not much is known about broadwing courtship. The pair seem to get together with little ceremony. Soon after arriving on the territory the male brings food to the female, who remains near the nest site. She may fly out to meet him as he approaches and may give a whining call.

Within a few days the pair begins to build the nest. Each year the birds build a new nest, possibly because it is built quickly and often blows down during the winter. The nest is usually placed in a crotch of a deciduous tree, sometimes on top of an old nest of a squirrel or crow. Both male and female build; the male constructs the base with twigs and the female adds the lining, which consists of bark, moss, tree flowers, and sprigs of evergreen or deciduous trees.

The female continues sprig gathering until late in the nestling phase, bringing as many as four sprigs a day. The reason for adding greenery is not known, but theories suggest that the sprigs add bulk to the nest, cover prey remains, deter parasites, or are eaten to provide vitamins. The habit of bringing sprigs to the nest is shared by several species of raptor, including the red-tailed and sharp-shinned hawks and the bald eagle.

The female lays 2 or 3 eggs and does all of the incubation. The eggs are incubated 30 to 38 days and the young hatch over a period of several days.

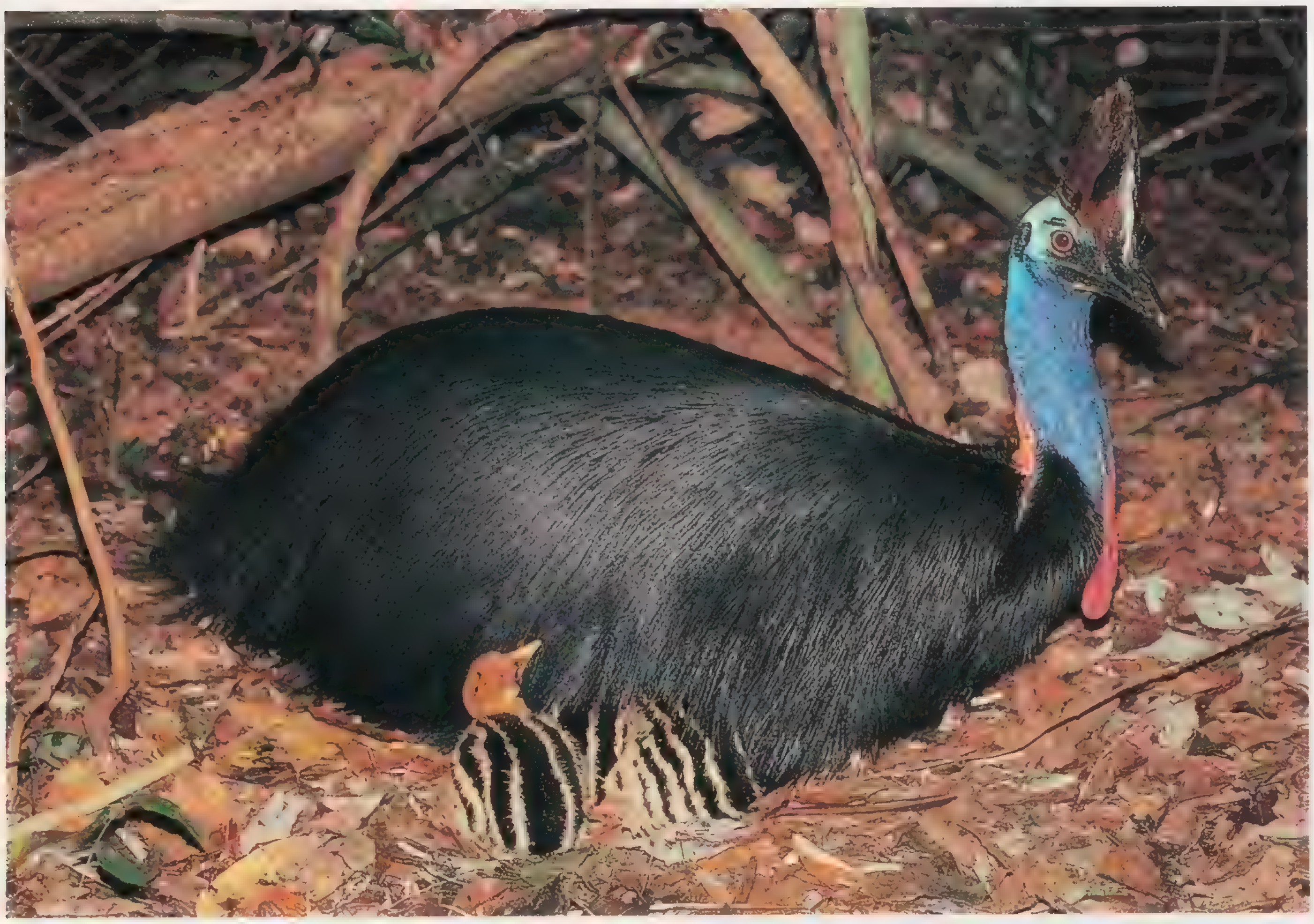
For the first week after hatching the female broods the young continuously while the male brings food. At the start of the second week, the female may leave the nest and hunt on her own, possibly to supplement the male's offerings. At first the parents tear off bits of meat and feed them to the young, but after the first three weeks the nestlings are capable of eating on their own.

When the nestlings are five weeks old they begin to move off the nest and onto adjacent tree limbs. At this time they can give the *sigeeee* call and frequently do so. By the sixth week they have fully developed feathers and can fly. Then parents and fledglings move away from the nest area but may stay together until their spectacular fall migration.

Think what it must be like for a young broadwing to start on its first flight south. Instinctively it seeks out rising thermals on a September morning, and as its journey progresses, it finds itself in the company of more and more broadwings, until after a few days, it is surrounded by thousands of other hawks on the same journey. What an amazing experience for that young hawk, and no less wonderful for us as we wait expectantly on mountaintops to watch the hawks glide overhead.

—**Donald & Lillian Stokes**

Note: For information on hawk watching sites, contact the Hawk Migration Association of North America (HMANA), 377 Loomis Street, Southwick, Massachusetts 01077.



FRITHFOTO (BRUCE COLEMAN INC.)

Starting life as a fuzzy striped chick, the double-wattled cassowary grows into a 130-pound six-footer with feathers that resemble sleek black fur.

The Cassowary

An Australian photographer lies dead having been struck with a most unusual weapon. Witnesses describe the assailant as male, 6 feet tall, about 130 pounds, last seen wearing a fur coat, blue scarf, and cap. Police searching for clues find footprints that look as though they were made by a small dinosaur. In this bizarre incident, which occurred in 1953, the photographer apparently ignored warnings and entered the cage of an incubating double-wattled cassowary. The brooding male leaped into the air, flailed his massive legs, and disemboweled the intruder with kicks from his stilettolike inner toenail.

Attacks like this are relatively rare in Australia because the normally shy cassowary prefers to run when threatened. In Papua New Guinea, however, where the powerful birds are kept as village pets, the tragedy is all too common. The striped chicks are easily tamed and frequently run free. As they mature, some become aggressive and maim or even kill villagers.

The largest warm-blooded animal in New Guinea and the only bird powerful enough to kill humans has been part of the New Guinea culture for millennia. For generations, New Guineans have hunted, raised, and traded cassowaries for food and weapons. In their Stone Age culture that prevailed until western contact in the 1930s, the Highland tribes of Papua New Guinea fashioned bone daggers and spear points from massive cassowary drumsticks after the rich meat on the bones had been eaten. Although tribal vendettas claimed few human lives, many warriors were injured with weapons fashioned from these birds. In a display of power, warriors would sometimes slay their captive cassowaries to demonstrate what might happen to their opponents. Also, by killing their own birds, warriors flaunted not only their aggressive intent but also their wealth.

Cassowaries continue to play an important role in the economy of Papua New Guinea. As symbols of wealth, they bring prestige to the one who donates a bird for ceremonial feasts. The large birds figure prominently in bridal dowries. A cassowary, several pigs, and some money might cinch the marriage knot. The birds' feathers are used for personal adornment in traditional headdresses. Wigmen of the southern Highlands wear cassowary topknots in their hair and wing quills through their perforated nasal septums. Artists from the Sepik River, a region internationally renown for "primitive" art, use the furlike feathers to decorate masks and carvings.

As Papua New Guinea switches from a bartering to a cash economy, an industry has sprung up to supply cassowaries. Since the demand in the Highlands often exceeds the supply, traders will venture into regions of unexploited populations to procure birds, knowing they can expect to receive as much as $1,000 for a single cassowary! To relieve the pressure on wild birds, the government of Papua New Guinea, with financial and technical assistance from New Zealand, has investigated the commercial feasibility of raising cassowaries. The project has been helpful in improving husbandry techniques. Whereas once it took about three years to raise a cassowary in captivity, with better diet and more sunlight birds can now reach market in one year. This helps stabilize prices and brings more profit to the farmers.

The wildlife division of the Papua New Guinea government is also concerned that exploitation and habitat destruction are affecting casso-

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Mark Rauzon is an environmental writer, photographer, and illustrator of children's science books. He is also interested in subsistence uses of indigenous wildlife.

wary populations countrywide. Accordingly, Papua New Guinea has established some wildlife management areas to protect rainforest habitats from being cleared to supply logging companies with pulp and tropical hardwoods. Some populations of cassowaries, birds of paradise, and other wildlife species in remote areas are temporarily safe.

Traders will venture into regions of unexploited populations to procure birds, knowing they can expect to receive as much as $1,000 for a single cassowary.

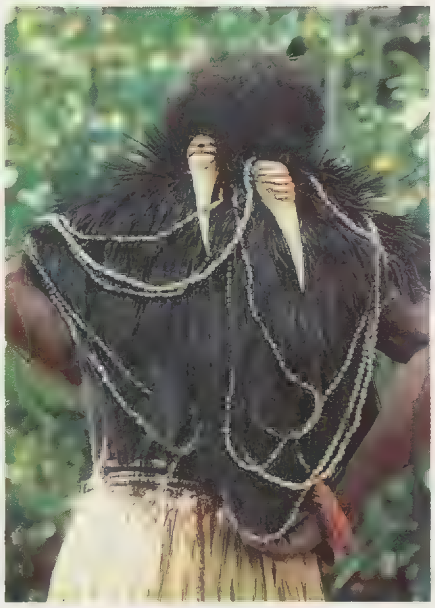
Australia has also established reserves to protect cassowary populations, but in Queensland, logging of unprotected rainforest removes fruit-bearing trees upon which the birds depend. With a diminishing habitat, natural disasters take an increasingly significant toll. In 1986 Cyclone Winifred knocked down many large fruit-bearing trees and drove the hungry cassowaries into rural gardens searching for food.

Increased human contact with cassowaries has set the stage for more encounters with these potentially dangerous birds. Australians suggest, if confronted by an irate cassowary, that one way to escape is by attempting to make yourself appear larger than the bird. Try raising one hand above your head to produce a crude silhouette of a bird head and praying you don't anger a kicking cassowary.

Cassowaries belong to a group of primitive, flightless birds known as ratites. Prior to the disintegration of the supercontinent, Gondwanaland, all ratites arose from a common lineage. Subsequent isolation of the continents created opportunities for separate species to evolve. Ostriches of African savannahs, kiwis of New Zealand forests, and rheas of the New World pampas each belong to discrete orders of ratites. Emus of the Australian outback and three species of cassowaries share the Order Casuariiformes.

Evolving in the Australasian rainforest, the cassowary has lost the stunted wings that other large ratites use as rudders when quick turns are necessary. Instead, cassowaries retain three to five vestigial wing quills to protect the feathered rump from thorns. The glossy black feathers that resemble fur lack barbels and are double-shafted. The casque atop the cassowary's head is another unique feature among ratites. A sign of age and social dominance, it is used to part tangled undergrowth as the bird runs headlong through the forest.

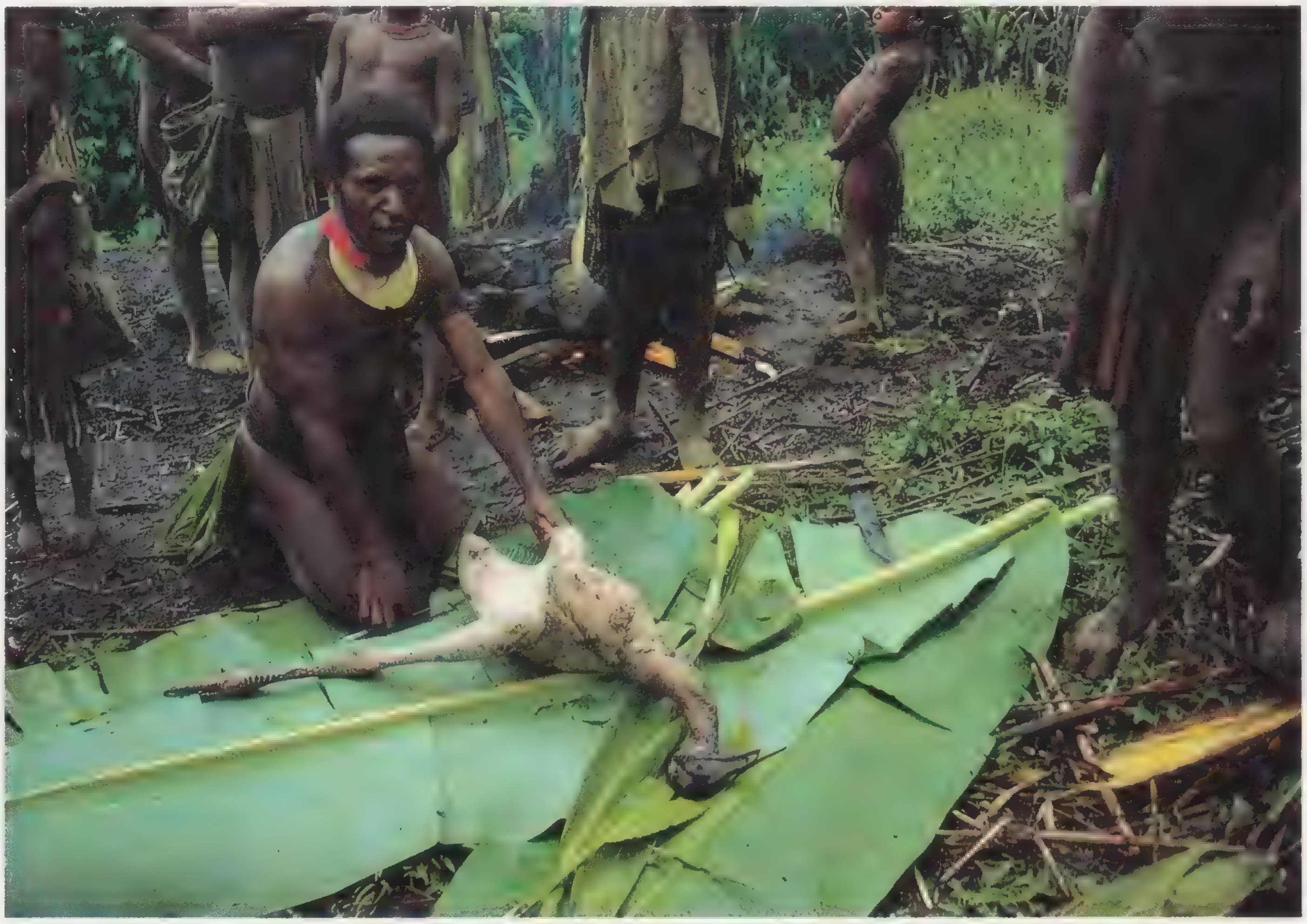
M. J. RAUZON



GERRY ELLIS (ELLIS WILDLIFE COLLECTION)

Cassowaries engage in kicking matches to assert dominance. The birds can also swim across streams and lakes with only their heads above water by propelling themselves with powerful kicks.

—**Mark J. Rauzon**



BRIAN COATES (BRUCE COLEMAN LIMITED)

The cassowary is an integral part of the culture and economy of Papua New Guinea. Its feathers are fashioned into capes and nose ornaments, and its meat is used for food.

Just Watching

Birding, that benign and most carefree of all avocations, is not exactly risk free. As a matter of fact its very innocence harbors a deadly menace. It leaves its proponents wide open to a hostile and suspicious world.

"I see," says the Turkish border guard as he unscrews the barrel of your Leitz Trinovids and waves over the pair of stolid looking thugs. "You are just watching the little birds. How very interesting."

But birders don't have to travel to far-off lands to put themselves in harm's way—a fact I discovered several years ago while birding in Colorado. It only takes an incautious moment to put yourself between a rock and a hardened site . . . er, spot.

It sure seemed like a class A dirt road and it was heading in the right direction and it sure looked like great bird habitat. (Funny, it wasn't on the map.) As we crested a hill, an adult ferruginous hawk launched itself from the road and alighted not far away. Hard braking planted us neatly in front of an innocuous-looking enclosure. Some sort of pipeline relay station, I surmised. My companion and I leaped from the car bearing an arsenal of optics and enough camera equipment to stock a retail outlet. Obsessed with the bird, we didn't notice the approaching pickup truck until it was almost upon us. That's odd, I thought. There isn't a town within fifty miles of here.

Behind the wheel, behind a big, toothy, insincere smile, was a Rambo with the eyes of an IRS auditor. "Need any help?" he inquired mildly. "Uh, no, no," I replied suddenly. "Just looking at that hawk over there," I said, pointing to the bird. "Bird watching," I added, to build my case.

After a brief conversation limited to his questions and my answers, he drove on. Sensitized by this odd encounter, I turned my attention to a nearby impoundment. Behind a very serious-looking chain-link fence topped with barbed wire was a square concrete pad sprouting some curious hardware including a ventilation system. On the fence was an interpretation-free sign that read: NO TRESPASSING. USE OF DEADLY FORCE AUTHORIZED.

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KENNETH V. ROSENBERG

"Oh," my companion exclaimed. "What is that? An oil well?"

"Oil wells," I whispered, "don't breath." Needless to say, we didn't linger.

Well, you say, situations like that are avoidable. Just steer clear of unmarked dirt roads. Situations, maybe; people are a little less predictable.

I brought down my binoculars to find myself nose to nose with a man who could have been issued a death certificate by any coroner in New Jersey. Set between a toothless grin and long, lank greasy hair were the eyes of a cadaver. It was draped in the lower half of a wet suit. In one hand it carried a pair of flippers, in the other a loaded spear gun.

"What are you doing?" it asked innocently.

"Watching birds," I said, trying not to show that my spleen was turning into the consistency of yogurt in the sun.

"Yea?" it wondered.

"Yea," I affirmed. "What are you doing?" I asked, hoping to deflect its interest away from me.

"Killing fish," it said. Not fishing, not hunting fish. Killing fish!

"You're a fisherman?" I inquired, hopefully.

The cadaver made a series of grunting noises that I interpreted to be laughter. "Nah," it said, recovering from the momentary lapse into animation. "I'm a mercenary. Just got back from Angola. Nasty stuff, mercenary work," it added with resignation. "Nasty stuff."

I babbled something about having to check in with the park police every 15 minutes and how I was late and how they would be sending out a search team any second as I turned and walked away, checking my torso for projectiles.

Law enforcement personnel can be a bane or a bonus, depending on the situation. There are few committed Big Day birders who have not enjoyed nocturnal encounters with patrolmen eager to learn what it is that prompts grown-ups to stand at the end of dirt roads at 3 a.m. Equally perplexed was the New Jersey state trooper who chanced to spy the spotting scope mounted on a lethal looking gunstock in the back seat of my car. Clearly, my startled: "What? Have you been watching Dragnet too long?" was not the correct reply to his curt: "All right, out of the car, put your hands on the hood."

All of my scrapes put together don't approach the story of the young German birder whose quest for desert lark led through a minefield and, before an Israeli patrol finally caught up to him, into Syria. And they pale when cast in the light of the two British birders whose day afield ended in a Turkish prison under charges of espionage.

So have fun. See good birds.

But hey, let's be careful out there.—**Pete Dunne**

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